THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXIII. No. 556.] LONDON, JANUARY 6, 1874. [26TH YEAR.] Price 6d.

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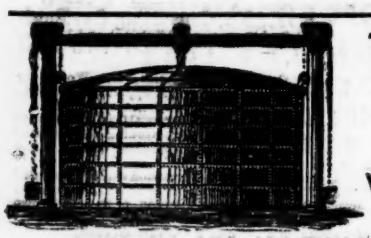

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BY HER MAJESTY'S ROYAL LETTERS PATENT.

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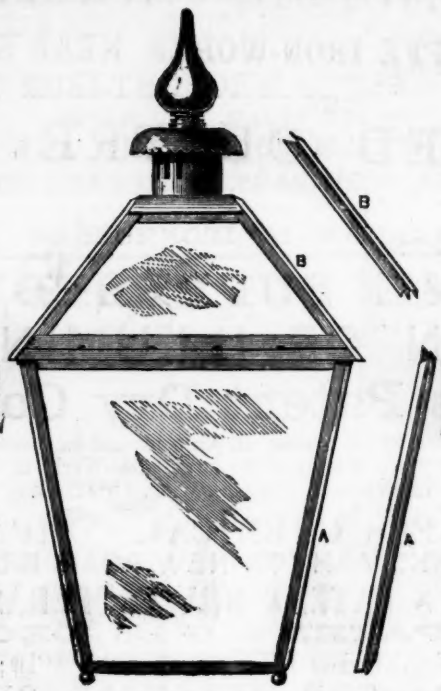

KEEN'S PATENT DOUBLE-FRAME CLIP-LAMP.

The increasing demand for these Lamps is ample proof of their superiority over all others. They are only made of the best materials, and are somewhat improved in the manufacture. Nothwithstanding the immense advance in the prices of the materials (tin, glass, &c.), the price has been kept as low as possible. They only require to be thoroughly known to be generally adopted. Several hundreds have also been sold to *Foreign Gas Companies*, and have given great satisfaction.

The Advantages are as follow:

The Clips A and B effectually secure the glass, and are constructed to form an extra frame to the Lamp.

No breakage of glass through frost, expansion, or contraction.

No hacking out for repairs, with its expensive labour, aud consequent damage to frame.

They are much stronger, more durable, and lighter in appearance.

No expense of labour to clean off smoky glass caused by a flickering unsteady light, because the air admitted equally through the Patent Clips prevents all undue draughts. They are glazed without putty, and the Clips (A and B as shown) have only to be lifted off for replacing any broken squares.

When required to be painted, they can be done in half the time of the ordinary Lamp, as the glass can be removed for that purpose.

In packing large quantities for transit, the glass can be packed separate, thereby effecting a great saving in carriage.

They have been put to the most severe tests on the sea-coast and hilly districts, and are pronounced perfect and everything desired.

TESTIMONIALS.

Consumers Gas Company, Weymouth, March 8, 1872.

Dear Sir,—I am pleased to bear testimony to the great superiority of your Patent Double-Clip Lamp over those we have hitherto had in use. Nearly 12 months ago I had 72, and they have given me perfect satisfaction in every respect. The free circulation of air consequent upon the glass being placed in without putty, ensures a very unusual steadiness of flame. There is a great saving in glass, as we now seldom get the glass broken, and the frames are largely protected from the influence of the weather by the Clips. Altogether I consider them better far and much more economical than those generally in use.

I am, yours faithfully,

(Signed) THOMAS STONE, Engineer and Manager.

Gas-Works, Reigate, Surrey, March 30, 1872.

Dear Sir,—I am pleased to inform you that your Patent Street Lamps in use at this place, and at Sutton, are found very satisfactory in their working, and it is my intention to use more of them. I am, yours very truly,

(Signed) C. R. MEAD.

Gas-Works, Hastings, April 19, 1872.

The expansion and contraction of the glass in Keen's Patent Double-Clip Lamp is more free than any other I have seen, and consequently the breakage is much less. I have used them for some time, and shall adopt them generally as I have opportunities.

(Signed) ALFRED H. WOOD, A.I.C.E.,
Engineer to the Hastings and St. Leonards Gas Co.

Andover Gas-Works, Dec. 10, 1873.

Dear Sir,—As you wish me to say what I think respecting your Double-Frame Clip Gas Lamp, I reply we think them a great improvement on the old ones. We now dispense with the glazier; any of our men can replace a breakage in a few minutes. As our old ones are worn out, we shall replace them with yours. As to ventilation, the old lamps were too close, and much glass was destroyed by the heat of the gas on cold, stormy nights. I can recommend their adoption to other gas companies, knowing they will be pleased with them.

I am, dear Sir, yours very truly,

(Signed) S. SHAW.

Gas-Works, Wellington, Somerset, Dec. 10, 1873.

Dear Sir,—Having used your Patent Double-Clip Street-Lamp three winters, I can confidently recommend them. They are a great improvement on the old Lamp and fully bear out all you say of them.

I am, dear Sir, yours very truly,

(Signed) HENRY G. CROWE, Manager.

Gas Company, Farnham, Surrey, Dec. 9, 1873.

Dear Sir,—Your Patent Double-Clip Lamps have been in the use of this company for several years, and give the utmost satisfaction. As soon as the old sort of Lamp is worn out it is invariably replaced with one of yours. It is best for each to judge for himself of the merits of an invention of this sort, but I strongly recommend it to all gas companies. I am, yours truly,

W. WELLS.

Any size or shape Lamp, in Copper, Brass, or Tin, made on the same principle.

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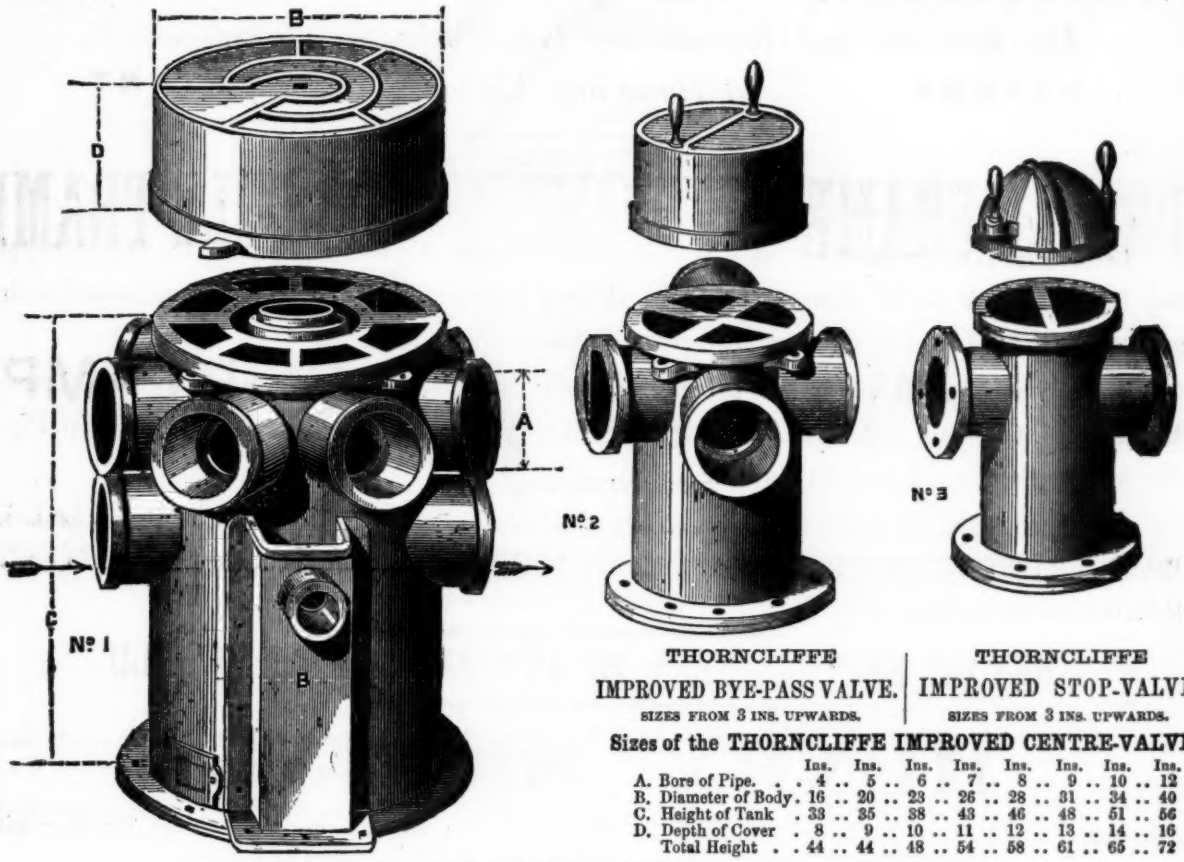

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THORNCLIFFE IMPROVED STOP-VALVE. SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

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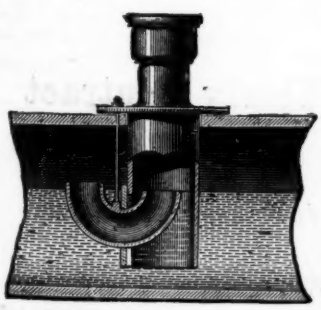
And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



Messrs. N. C. & Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING DIP-PIPES.

These Patent Self-Acting Dip-Pipes are rapidly coming into general use by gas companies. By their use the whole of the pressure caused by the old kind of Dip-Pipes is entirely removed, therefore the yield of gas per ton of coal is considerably increased. They also act as a perfect safeguard against the deposit of carbon (or scurf) inside the retorts.

A saving of fuel is effected, and the wear and tear to the retorts greatly diminished.

They are also perfectly Self-Acting, they being regulated solely by the gas. They cannot get out of repair, and when once fixed, will last as long as the old kind, and can be easily adjusted should the hydraulic main sink; they can also be worked with advantage where there is no exhauster.

Testimonials can be had from Herbert Unwin, Esq., engineer of the Sheffield United Gaslight Company and the Penistone Gas Company. At both these companies works they have been in constant operation for several months. Further testimonials can be had on application to the Patentee, J. G. Hawkins, Effingham Street Gas-Works, Sheffield.

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CONTRACTOR for erecting Retort-Houses, Stages, Coal Stores, &c., and to erect the Ovens, supply and *set* the *Retorts* on his *improved* principle, whereby a proper and uniform heat is maintained with a great SAVING OF FUEL, and durability of workmanship.

He also supplies all necessary Fittings, including Evaporizing Pans, Furnace Doors and Frames, Mouthpieces, Crossbars and Screws, with Steel or Wrought Iron Lids, Ascension, H, and Dip Pipes, Wrought or Cast Iron Hydraulic Main, or Valves.

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WITH

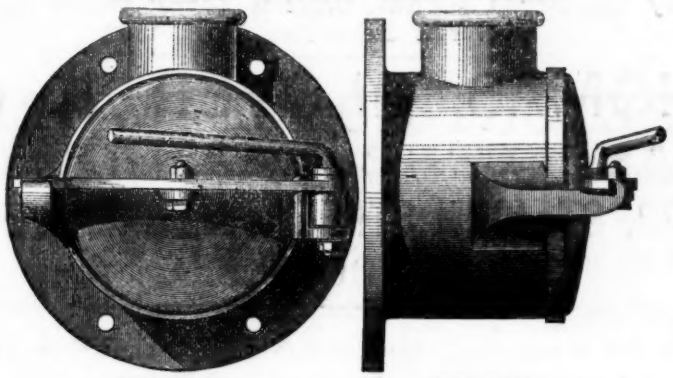
HOLMAN'S PATENT ECCENTRIC FASTENINGS.

OVER 7000 IN USE.

NO LUTING.

LIDS HINGED TO MOUTHPIECES; NO LIFTING ON OR OFF.

NO SCREWS FOR FASTENING.



FRONT VIEW. SIDE VIEW.

SIMPLE.

ECONOMICAL

DURABLE

EFFECTIVE.

NO DUPLICATE LIDS REQUIRED.

These Lids are proved by many eminent Gas Engineers to be the most efficient, saving much time, labour, and expense; are opened and closed as quickly and with as little trouble as an ordinary furnace door, and by their use the Retorts are soundly sealed during the whole period of carbonization.

THESE LIDS ARE ADOPTED BY THE FOLLOWING (AMONG MANY OTHER) GAS COMPANIES:—

The Gaslight Company, Beckton (where over 2000 are in use).	The Gas-Works, Royal Arsenal, Woolwich.	The Nottingham Gas-Works.
„ Gaslight Company, Bow Common.	„ Alliance and Dublin Gas-Works.	„ Newcastle-on-Tyne Gas-Works.
„ London Gaslight Company.	„ Edinburgh Gas-Works.	„ Carmarthen Gas-Works.
„ Independent Gaslight Company.	„ Manchester Corporation Gas-Works.	„ Merthyr Tydfil Gas-Works.
„ Phœnix Gaslight Company.	„ Salford Corporation Gas-Works.	„ Ystrad Gas-Works.
„ South Metropolitan Gaslight Company.	„ Rochdale Corporation Gas-Works.	„ St. Alban's Gas-Works.
„ West Ham Gas Company.	„ Liverpool United Gas-Works.	„ Over Darwen Gas-Works.
„ Imperial Gaslight Company.	„ Birkenhead Gas-Works.	„ Aylesbury Gas-Works.
	„ Birmingham Gas-Works.	„ Cardiff Gas-Works.

The Morton's Lid is made circular in form, that being the most convenient and suitable shape. It can be used for Retorts of any section, by adapting the Mouthpiece casting from the D, oval, or other shape, at the back, to circular in front.

The following important Testimonial, among others, has been given:—

The Gaslight and Coke Company. Engineer's Office, 6, Westminster Chambers, Nov. 14, 1871.

Dear Sir,—In reply to your inquiry, I have the pleasure of stating that the whole of the Mouthpieces at Beckton have Morton's Lids attached to them, and they have given us every satisfaction. We have 2160 in use.—I remain, yours truly, (Signed) F. J. Evans.

TANGYE'S

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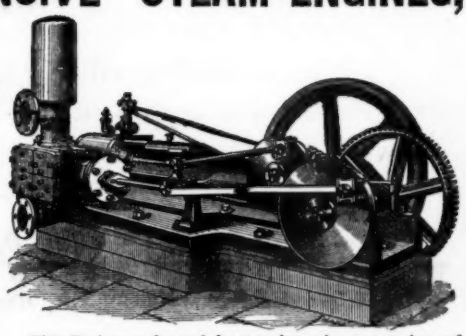
VIENNA, 1873.



This Engine can be used for pumping only, or pumping and driving other Machinery simultaneously; or, by the sliding of a single pinion, the Engine can be disengaged from the Pump, and the former employed exclusively for other purposes.

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Size.	Nominal H. P.	Diameter of Cylinder.	Length of Stroke.	Price of Engine.	Feed Pump, extra.	Variable Expansion extra.
		in.	in.	£ s.	£ s.	£
B	2	4	8	32 0	3 0	—
C	3	5	10	38 15	3 15	—
D	4	6	12	46 0	4 0	10
E	6	8	16	70 0	5 10	12
G	8	9	18	90 0	6 0	13
H	10	10	20	115 0	7 10	14
J	12	12	24	135 0	8 0	15
K	18	14	28	160 0	10 0	16

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COMBINED WITH HOLMAN'S DOUBLE-ACTION PUMP.

Size. Nominal H. P.	C 3	D 4	E 6	G 8	H 10	J 12
	£	£	£	£	£	£
Engine and 3in. Pump	62	—	—	—	—	—
Do. and 4in. do.	68	75	—	—	—	—
Do. and 5in. do.	—	78	112	—	—	—
Do. and 6in. do.	—	80	117	135	160	185
Do. and 7in. do.	—	—	124	145	172	195
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THE JOURNAL OF GAS LIGHTING, WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JANUARY 6, 1874.

Circular to Gas Companies.

In a few days our subscribers will receive a form, which we hope they will kindly fill up, and return at their earliest convenience. It will be seen that this year we ask information for which we have not previously applied. All concerned in the management of a gas undertaking must often have felt the importance of knowing what has been done, or is doing, by others occupied like themselves. The past year, too, has been so exceptional in the history of gas undertakings that it is desirable to place on record facts which may prove of interest and value in future times. It will, for example, be of advantage to have a complete list of the advances in price made during the past year. We have published all that have been brought under our notice, but the instances we have given can be only a few of those that have actually taken place. We may estimate that more than one-half of the gas companies in the kingdom have been compelled to raise their prices, and we believe a majority of the local authorities possessing gas undertakings have done the same. To further extend the interest of the list we publish annually, we ask our readers to make a return of the present price of gas, and, in the cases of statutory companies, of the parliamentary maximum. In view of future legislation, it will be of value to know how many companies are compelled to charge a price which the Legislature has said they shall not exceed. We ask also the average illuminating power of the gas. We know the parliamentary standard for statutory undertakings ranges from 10 to 30 candles, and it will be interesting to have a general view of the illuminating power all over the kingdom. In asking managers and directors to supply us with these particulars, we are conscious only of asking information which it will be of interest and value for all to possess.

The present year opens with a prospect of some fall in the price of coal. At present the fall is not very decided, but there is an obvious tendency downwards. We have repeatedly warned our readers that a return to anything like the prices of 1870 is never to be expected, and we are happy to find ourselves confirmed in this opinion by Mr. Scott, the registrar of the London Coal Market, whose report on the trade for the past year is published in another column. The present fall in price is certain to be used as an argument against any further increase in the price of gas; but, up to this time, the reduction at Newcastle is too insignificant to be taken into account in making an estimate for the future. Large gas companies are compelled by the necessities of their case to make long contracts, and we dare say, in most cases, the coal required for the present year is already bought. The smaller companies may get the advantage of the reduction, which does not, as yet, exceed 1s. per ton.

The increase of price announced by the Phœnix Company is, as we anticipated it would, producing a great outcry. It is unfortunate for the company that their limits in one direction impinge upon the limits of the South Metropolitan Company, and, consequently, the glaring contrast is presented of gas on one side of a road costing 3s. 2d., and on the other side 4s. 6d. —a difference of 1s. 4d. per 1000 for gas of about the same quality. No doubt the consumers of the South Metropolitan Company think themselves lucky, and they are so; but if any of them are disposed to join their neighbours in an agitation for the absorption of the gas companies by the Metropolitan Board, they will do well to remember that there is a process called "levelling up," and the equalization of the price of gas in London would involve an addition to the South Metropolitan rate. It may be taken as certain that with the capital the Board would have to engage in the combined gas undertakings, it would be impossible for them to sell gas at 3s. 2d. The charge, indeed, is much more likely to equal that now imposed by the Phœnix Company. So far, then, as South Metropolitan consumers are concerned, the change of proprietorship could only be disastrous.

The Secretary of State for the Home Department has inquired of the Metropolitan Board, whether they were at all concerned with the promotion of the bill for the purchase of the gas companies, to which we have before alluded, and has been answered with an emphatic "No!" Mr. Lowe, we fancy, would not be averse to some sensational legislation, and it is not unlikely that he may, if he should retain office, take the case of the metropolis in hand. He has expressed his inability to do so in the coming session; but the Prime Minister is almost pledged to Corporation reform, and although nothing can be effected this year, we may possibly have from the Government some suggestions of a scheme for the municipal government of the whole metropolis.

The Vestry of St. George's Hanover Square, more clever at litigation than in lighting and cleansing the streets, have resolved, not unnaturally, "that they strongly object to any increase in "the price of gas." They have gone a step farther, and resolved that they will not be bound by any proceedings or certificate of the commissioners appointed by the Board of Trade to revise the price of gas for 1874. This latter is a strong resolution, which will be read with interest in Westminster Hall. It opens up a prospect of more than one lawsuit, which can, however, have but one result—the infliction of costs on gas consumers and ratepayers. Can it be that Mr. Leslie is acting in the interest of the gas companies to keep up the price of gas? or is he the tool of a too clever lawyer? To us, his proceedings are only explicable upon one hypothesis or the other.

Considering the discussion on the affairs of the Cork Consumers Gas Company, which has taken place in our columns, the report of Mr. A. G. V. Harcourt, the commissioner, which we publish to-day, will be read with interest. He seems to us to hold the balance fairly between those who seek to justify a very large amount of unaccounted-for gas, and those who insist on its immediate reduction to very moderate limits. In his calculations he allows for a loss of 15 per cent. of the gas made, which is reasonable enough, though such a result will be unattainable by the company for some time to come. On one point Mr. Harcourt may, we do not say he does, speak without his book. He condemns the Cork Company for making so little ammonia. Is he certain that the Welsh coal which the company have been using contains as much nitrogen as the Newcastle coal, which yields so much ammonia to the London companies? We have no analysis of Welsh gas coal to refer to; but we cannot think the engineer of the Cork Company would allow much ammonia to escape if it were formed. Altogether we fear the Cork Company will gain but little by the Provisional Order, and must content themselves with considerably less than 5 per cent. during the present year.

The Leeds Corporation are promoting a Bill to enable them to raise the price of gas in the borough, and, at starting, a very unwise step has been taken by a majority of the Town Council. The Gas Committee recommended that the maximum prices fixed should be 5s. (in place of 3s. 9d.) in Leeds, and 6s. in the out-districts. It has, however, been resolved by the Town Council that the increased prices shall be 4s. 6d. and 5s. 6d. respectively. The majority in the council might have remembered that it was not necessary that the maximum prices should be charged, and they might have trusted the Gas Committee to do their best for the borough. It is more than probable that henceforth we shall be liable to coal panics, as we are to monetary panics, and it would be wise for the future to have a wide margin for prices. Five shillings would not be a long price to-day for the gas supplied in Leeds, and who knows that it may not, ere long, be an unremunerative price? We would advise the Corporation to adhere to the charges fixed in the original Bill.

The Paddington Vestry are setting in earnest about the self-imposed task of managing the public lighting, and have started in a way which promises success. We know very well that the Imperial Company will supply them with gas of proper quality, and at proper pressure, and the result must depend upon the perfection of the apparatus set up by the vestry, and the attention given to keep it in proper order. It is too common a practice to put a thing in its place, and leave it there till it will work no longer. The Paddington Vestry seem disposed to act otherwise, and provide for a regular periodical inspection of all their apparatus. This strictly carried out will leave nothing to be desired in the public lighting of the district.

A mistake committed last week in the estimate of the quantity and cost of the coal carbonized by the Manchester Corporation, has induced us to reconsider the whole question, and brought us to the conclusion that the quantity of coal hastily guessed at is considerably too great, and, consequently, that if the capital and working expenses are calculated out for the exact amount of coal carbonized, the gas undertaking in Manchester will be found in about the same position as the average London companies. We shall return to the matter on a future occasion.

THE WATER QUESTION IN LONDON AND LIVERPOOL.

The past year has witnessed active exertions on the part of the metropolitan water companies to provide the means of meeting the once popular demand for a constant supply of water at high pressure. On the other hand, the local authorities have continued to exhibit the same apathy, and it is clear that if it had rested with them the boon for which they once so loudly clamoured would have been withheld from the metropolis for an indefinite time. We believe we are right in saying that no one of these authorities have exercised the power conferred by the Metropolis Water Act, 1871, and called upon a company to give a constant supply to their district or any part of it. The water companies, however, have made great progress with the works which were rendered necessary by the Act of 1871, and the most important—the New River Company—is already in a position to give a constant supply throughout their strictly metropolitan district, whenever it may be demanded. With a view to the future, they have also in hand extensive works for the supply of a growing district beyond their metropolitan limits. The company next in importance, the East London, who were foremost in giving a constant supply wherever it was possible, now give notice that, by the middle of the present year, they will be ready to afford a constant supply to the most densely populated part of their district lying in Whitechapel, Spitalfields, and Bethnal Green. On the south side of the Thames, the Kent Company are rapidly extending their constant service system, so that by the 1st of March next, 5000 houses within their limits will have the advantage of the service. With a view to conferring the same benefit, the Southwark and Vauxhall Company are constructing large reservoirs at Nunhead, and providing additional engine power for the exigencies of the service. The Lambeth Company are also making extensions and improvements which, when completed, will render their works as perfect as any in the metropolitan district. The enormous reservoirs now in progress at Moulsey are intended to contain a quantity of water equal to ten or twelve days supply of the company's district. This large amount of storeage capacity will allow the company to choose the time for pumping, and by giving several days for subsidence, will relieve the filter-beds of much of their work. At the same time, however, the company are increasing the extent of their filtering surface, by converting the reservoirs at Ditton into filter-beds. Thus it may be anticipated that the turbidity of, and living organisms in Lambeth water will no longer be heard of, and people in Lambeth will be able to drink their water without alarm. The other Thames companies are not behind. The West Middlesex Company have extensive works in hand, and even now are ready to afford a constant supply to a great part of their district. The Grand Junction Company, too, have constructed a high-service reservoir at Kilburn, to afford a constant supply. Lastly, the Chelsea Company are rapidly enlarging their filtering surface, and providing improved and extended storeage for filtered water to the same end. Thus we see the companies everywhere doing their utmost to carry out the obligations thrown upon them by the Act of 1871, but the local authorities make no move. The reason, of course, is the regulations sanctioned by the Board of Trade, which would require a complete change of the fittings in the older parts of the metropolis. We are sorry to see that neither the nature nor the necessity for these regulations—as much required for the comfort of householders as for the protection of the companies—is yet understood, even by those who pretend to instruct us. It is with something more than astonishment that we read the following in a daily contemporary who comments on Major Bolton's last report:—

> The new fittings which the companies are authorized to require would be a heavy tax on every householder, while some of the rules to be observed are of the most arbitrary description. Major Bolton says that there will be great advantage, for example, in the abolition of waste or overflow pipes to our indoor cisterns. But he does not tell the public where the water is to go if the cistern should overflow. There is to be only a "warning-pipe," and the public, rightly or wrongly, understand this to mean that the water is to squirt on to the floor, and if not seen, and the overflow stopped, is to come trickling down the stairs or dripping through the drawing-room ceiling. This is a risk which the public are not prepared to run for the sake of saving a few gallons of water, and till they are reassured on this point, or the present regulations are altered, we shall never have a constant service in our London houses, whatever may be done by way of hydrants in the streets.

If the writer of the above remarks had taken the trouble to read the regulations he denounces, he would, of course, have found that the "warning-pipe" is simply the overflow-pipe brought outside the house, instead of being carried into a drain, and thus none of the dangers he fears will be incurred, while the risk of the contamination of the water by the absorption of noxious sewer gases will be prevented. The use of such a pipe, while an undoubted benefit to the consumer, will lead to the saving of some millions of gallons of water every day, by enabling inspectors to fix on houses in which the ball-cock to the cistern is out of order. Nothing can be more reasonable than this regulation, and it is one which the companies must insist on being carried out. So, too, with the use of waste-preventers to closets. There are hundreds of clever people in London who make it a rule to prop open the valves of their closets while the water is running into the cistern, in order, as they imagine, to flush the drains. Nothing of the sort is accomplished; it is a pure waste of water. With regard to the other regulations as to taps, joints, and the strength of fittings, they are made entirely in the interest of the consumer, and for the most part to prevent the catastrophe our contemporary above quoted imagines must result from the use of a warning-pipe. If water were at once turned on under high pressure, thousands of houses in London would be

flooded in consequence of the bursting of pipes, and where this did not occur there would be a constant dribbling from all the taps in the house; low levels would, in fact, be inundated, while higher levels would be without water. Of course it is a grievance that alterations of fittings cannot be made without expense. Plumber's work must be paid for, and it is rather dear. But we emphatically deny that these regulations involve an unreasonable cost to the householder. They were made to save him expense and discomfort as much as to save water. Regulations just as stringent have been made and enforced in other cities, and but for the fact that the Local Boards lend themselves to the outcry against the cost, some progress would already have been made in the metropolis. If the water supply were in the hands of the Metropolitan Board, the regulations would, as at Manchester, be enforced without mercy, and resistance now is merely a display of selfishness and obstinacy.

There is one other paragraph in Major Bolton's report to which we must refer, and that relates to the substitution of hydrants for fire-plugs. It is easy to see the many advantages which must result from this substitution. "Hydrants," it is said, "might "now and for some time past have been substituted for fire-plugs "upon about one-third of the entire mains of the metropolis, which "are constantly charged, but they have not yet been supplied." Whose fault is this? Further on we have the number of miles of streets containing mains constantly charged, upon which hydrants could at once be fixed, in each district, and the distances are worth quoting. They are, in the New River district, 168 miles; in Southwark and Vauxhall, 100; Lambeth, 90; East London, 70; West Middlesex, 65; Chelsea, 50; and Grand Junction, 41½ miles. Why, then, are hydrants not fixed? It is because the local authorities have to provide them.

The report of the able engineer of the Liverpool Corporation, which we publish in another column, may open the eyes of some to the necessity of the regulations and inspection so strongly objected to in this metropolis. The Liverpool works, grand as they are, have been at times almost insufficient to supply the demands made upon them. The reason for this is summed up in one word—waste, the chief source of which waste has been found to be defective private pipes and fittings; and at last the Corporation have been compelled to take the matter vigorously in hand. But they have not the strong powers some other Corporations are possessed of, and their intention is to apply to Parliament for a more complete control over the fittings used in houses. In connexion with this we may here call attention to the ingenious waste water meter designed by Mr. Deacon, which will prove of the greatest utility to all water undertakings. In an early number, we hope to give a complete description and drawing of this useful invention. To-day we content ourselves with directing the attention of our readers to the several purposes it fulfils.

There is another grievance in connexion with their water undertaking which the Corporation of Liverpool are seeking to remedy. Within the borough there is levied a water-rate of 6d. in the pound, and the water-rent is also 6d. in the pound. Beyond the municipal limits, however, no rate can be levied, and the Corporation have only charged a water-rent of 9d. Further, in a very valuable report issued towards the end of last year, it is shown by the town-clerk that consumers without the borough, but within the area of supply, are increasing at a much more rapid rate than the consumers within the borough; and t he revenue of the Water Committee suffers, of course, in that proportion. In the ten years 1861-71, the consumers in the borough have increased only 22 per cent., whilst beyond the borough the increase has been 141 per cent. Again, the assessments within the borough are on a higher scale than those beyond it, and the water-rate in the borough is collected upon a much wider assessment than the water-rent. Taking all these elements into consideration, the town-clerk estimates that the ordinary consumers within the borough pay for their water at the rate of 1s. 4½d. in the pound, as against 9d. in the pound paid by the ordinary consumer outside the borough. This is an important discrepancy; and, seeing that the borough only is responsible for the two millions odd of borrowed money which has been expended in securing a good water supply, it is certainly one which ought to be rectified at the earliest opportunity, especially as it seems probable that before long the Corporation will be compelled to seek a better supply at a further large outlay. The town-clerk shows that by reducing the rate paid by the burgesses to 3d. in the pound, and increasing the rent to 10d. in the pound, the contributions to water revenue would be much more equitably apportioned; because, having increased the water-rent in the borough to 10d. in the pound, the Water Committee would be enabled under the Act to increase the rents of outside consumers to 13d. in the pound, or 3d. more than the rent paid in the borough. The estimated loss on the reduced rate would be £28,490; whilst the increased receipts on the enhanced rent in the borough would be £22,489, and on the addition to the rent outside the borough £6416, giving a total of £28,905, showing a slight actual gain. The proposals of the Corporation are perfectly fair, and we hope they will be carried out, though, doubtless, it will not be done without opposition. We are sorry to see objections made to the additional powers asked for to prevent waste, Liverpool men also being opposed to what they erroneously call "costly fittings;" but in time they must become reconciled, and acknowledge that the blessing of a constant supply of water is worth the outlay.

Correspondence.

DAMAGE TO GAS-PIPES BY STEAM ROLLERS.

Sir,—In your paper of the 16th ulto. I perceive that the use of the steam road roller is to be discontinued in the Westminster district, in consequence of a claim made by the Chartered Gas Company for damage done to their pipes.

As the public are thus to be for a season deprived of the benefits resulting from the use of this machine, and in place of consolidated smooth roads must put up with loose metal, which the wheels are required to make into roads for themselves, it is very desirable that the experience obtained in the use of these machines should be placed before the public and authorities who are interested in the subject.

A steam road roller has been in use in Calcutta for a period of four years with great success; the roads are not only much more quickly and effectually consolidated by the steam roller than by the lighter roller, three or four tons weight, formerly used, but the roads are kept in better repair and at a less cost.

The new sewer and water works of the city were under my charge up to a recent period, and I was at first apprehensive that the weight of the roller might be productive of injury to them; its weight is about 27 tons, and is 5 feet wide on two rollers. After a careful examination, I could not find that any sewer was injured by the use of the roller, nor to my knowledge was any injury sustained by the water-pipes.

The gas for illuminating the city is supplied by the Oriental Gas Company, and many grievous complaints were made of injuries caused by our works. I do not remember a single instance of complaint by the gas company of injury caused by the steam roller.

In the streets of this metropolis, where very heavily laden vehicles are constantly passing, there would appear to be no greater liability to injury by the steam roller, with its broad wheels, than by the ordinary traffic. In fact, if the weight per inch of wheel and the diameters be square, there is probably less liability to damage from the broad roller than from the narrow wheel, as the former will be partly supported on the uncut soil, where the latter will be entirely supported by the more or less recently filled-in material of the pipe-trench.

The rollers in use in London give a pressure per square inch of breadth of about three tons, and this would be exceeded by a load of four tons on four wheels of four inches breadth, and therefore at least equally liable to injure the pipes beneath the surface; and who shall say that the gas-pipes in the Westminster district may not have been so injured?

I may mention that the water and gas pipes laid in Calcutta have turned and bored joints, and are therefore rigid and more liable to injury by the passage over them of a heavy weight than the lead-jointed pipes in general use in London.

Undoubtedly, injury to gas-pipes is a matter of great importance, but I think it will now be scarcely tolerated that the public should be required to use unmade roads of loose metal, when a little greater depth of excavation, and weight of metal in the pipes, would entirely obviate all objection to the use of the steam road roller on the score of injury to gas-mains.

W. Clark,
Late Chief Engineer to the Municipality of Calcutta.

9, *Victoria Chambers, Westminster, Jan.* 1, 1874.

THE NEATH GAS PURCHASE.

Sir,—In the Journal of the 30th ult., in the "Circular to Gas Companies," you state, upon apparently well-founded information, that—

"The Neath Company have expressed their willingness to sell their undertaking to the borough for £25,000," &c.

Acting for the Neath Gas Company as their consulting engineer, permit me to correct the statements made.

The directors of the Neath Gas Company have not yet expressed their willingness to sell to the corporation.

The corporation, being desirous of purchasing, offered—first, £25,000; secondly, 5 per cent. *interest* on the paid-up share capital since 1867, together with the mortgage debt and liabilities, which the corporation *estimate* to amount to a total of £29,500.

These offers the directors feel they cannot recommend the shareholders to accept; the *ascertained* liabilities, *plus* the 5 per cent. interest, amounting to more than the £29,500 offered by the corporation.

The bill promoted by the corporation for the purchase of the undertaking will be opposed in the present session by the Neath Gas Company, unless an offer (beyond £29,500) be made, such as the directors may advise the shareholders to accept. The terms of the bill are in direct variance with the exceptional clauses obtained in the Neath Gas Act, 1873, and which you have noticed in a former Journal, making this company, beyond doubt, a very valuable investment either for the shareholders or the corporation, should they become the purchasers.

Thornton Andrews.

Swansea, Jan. 2, 1874.

Petroleum in Burmah.—Captain Storer, agent for the British Government, reports that there are at present about 150 wells worked at Yegnangyoung, which yield 62,500 barrels of oil a year. At Pagan there are about 50 wells. The oil from these wells is obtained in a more liquid state, and more resembles naphtha. It is of a brackish nature, and is better suited for lighting purposes than the Yegnangyoung oil.

Legal Intelligence.

RICHMOND PETTY SESSIONS.

WEDNESDAY, DEC. 21, 1873.

(*Before Sir* H. W. PARKER, *Chairman, and a Bench of Magistrates.*)

THE THAMES CONSERVATORS *v.* THE SELECT VESTRY OF RICHMOND.

Mr. ENGLISH, of the firm of Frere, Cholmeley, and Co., solicitors to the Thames Conservators, applied under the Thames Navigation Act, 1866, and the Thames Conservancy Act, 1867, for a summons against the Richmond Select Vestry, as the sanitary authority, for not diverting the flow of town sewage from the Thames. Mr. English explained that under the 64th section of the Thames Navigation Act notice was given in 1869 requiring the vestry to discontinue the flow of sewage into the Thames. The notice expired on the 21st of October, 1870, and, as the sewage still entered the Thames, he had been instructed to apply for a summons. The vestry were liable, under the Act, to a penalty of £50 a day for every day since the notice expired.

In reply to Mr. Penrhyn, as to whether the select vestry had not obtained a local Act for the purpose of securing an extension of time, Mr. English said there was a local Act, but all reference to an extension of time was struck out in committee, the legal representatives of the Thames Conservators promising not to prosecute for two years, provided that at the expiration of that time the vestry had complied with the requirements of the conservators. The two years expired several months since, and the sewage had not yet been diverted from the river.

As four of the magistrates were either members of the select vestry or ratepayers, the application was heard by Mr. Penrhyn and Mr. Whitely, who granted the summons. Should the conservators insist on the recovery of the full penalty—viz., £50 per day since the 21st of October, 1870—it will amount to £83,200.

BRIGHTON POLICE COURT.—SATURDAY, DEC. 27.

(*Before Mr.* HOLLIS *and Colonel* SILVERTHORNE.)

CONVICTION FOR WASTING WATER.

Henry Watkins was summoned, at the instance of the corporation, for wilfully wasting water by allowing a tap to run an hour on the 22nd of December, and an hour on the following day.

Mr. FREEMAN, acting town clerk, appeared in support of the charge, and explained that the water had been wasted to such an extent on the defendant's premises that it became necessary to place a watch, when it was ascertained that on the two days in question a tap was allowed to run over a sink for an hour on each occasion, wasting at the rate of four gallons a minute.

The defendant admitted the charge, but denied wilful negligence, as he was under the impression he was entitled to let the water run for the purpose of flushing the sewer. The cook every day emptied a quantity of kitchen refuse into the sink, and it was necessary to carry such refuse away by allowing water to run into the drain.

In reply to Mr. Hollis, Mr. FREEMAN said the supply was not a constant one. It was intermittent, and was shut off at a certain hour every day.

A fine of 10s. in each case was imposed.

Miscellaneous News.

GAS AND WATER WORKS FACILITIES ACT, 1870, AMENDMENT ACT, 1873.

BOARD OF TRADE INQUIRY AT CORK.

Report of Mr. A. G. VERNON HARCOURT *to the Board of Trade.*

Mr. A. G. Vernon Harcourt, the commissioner appointed to inquire into the circumstances attending the application of the Cork Consumers Gas Company for an increase of price, has made the following report to the Board of Trade:—

"*Christ Church, Oxford, Dec.* 9, 1873.

"Sir,—I have the honour to report, for the information of the Board of Trade, that in accordance with your minute of Oct. 13, I held an inquiry at Cork on the 12th ult., with reference to the application for a provisional order made to the Board of Trade by the Cork Gas Consumers Company, and the objections thereto urged by the corporation. The order proposed by the Gas Company would increase the maximum prices of gas prescribed by the Cork Gas Act, 1868, as follows:—Present maximum within the district, 4s. 9d. per 1000 cubic feet; without the district, 5s. 3d. per 1000 cubic feet; public lamps, £4 per annum. Proposed maximum within the district, 5s. 6d. per 1000 cubic feet; without the district, 6s. per 1000 cubic feet; public lamps, £4 15s. per annum; limiting the company's dividend to 5 per cent., instead of the present limit of 8 per cent. Until the half year ending Dec. 31, 1872, the company earned enough in each half year since their Act was passed to pay a dividend at the maximum rate, and to make some addition to their reserve-fund. For that half year, also, a dividend was paid at the rate of 8 per cent., amounting to £4558 10s., of which £4262 6s. 2d. was from the balance of profit and loss, and £296 3s. 4d. from the reserve-fund. For the half year, ending June 30, 1873, a dividend was declared at the rate of 6 per cent., amounting to about £3260, of which the reserve-fund has to supply £3000, the balance of profit for the half year being only £622 12s. 2d. It is proved beyond all doubt, by the returns made by the company to the Board of Trade, and the evidence given before me, that the cause of the sudden decline in the prosperity of the company is the sudden rise in the cost of production of gas. No change has occurred in the management of the company, or in their mode of manufacture, to which this decline can be referred. The Corporation of Cork object to the application of the company 'inasmuch as they believe the alleged deficiency to pay 5 per cent. dividend on the undertakers capital, upon which the present application is grounded, is attributable not to the causes which would justify the Board of Trade in making the order, but to the undue increase of capital, the want of proper and efficient working of the concern, to a deficient yield of gas per ton of coal carbonized, and to the excessive amount of unaccounted-for gas.' These objections are not disposed of by the fact above stated, that the decline in the prosperity of the company is due, not to a change in their management, but to the increased cost of production of gas; since, where a company have been making for many years their maximum dividend, it does not follow that the management has been the best possible, but rather that the incentive to better management has been wanting. And if it should appear that with due care and management the present maximum price of gas is sufficient to yield a dividend at the rate of 5 per cent. the application for a provisional order would, I conceive, fall to the ground. The objection that the company have increased their capital unduly was not strongly supported at the inquiry. The rate of increase is shown by the following figures:—

In June,	1868,	the paid-up share capital was		£95,546
,,	1869,	,, ,, ...		101,371
,,	1870,	,, ,, ...		110,613
,,	1871,	,, ,, ...		113,243
,,	1872,	,, ,, ...		113,419
,,	1873,	,, ,, ...		124,261
Total capital per 1 million cubic feet,			1868	730
,,	,,	,,	1869	781
,,	,,	,,	1870	785
,,	,,	,,	1871	768
,,	,,	,,	1872	749
,,	,,	,,	1873	810

The company's debentures amounted to £18,900 in Dec. 1868, and are now £17,950. The additional capital of £10,000 raised during the last year has been expended on additions to the works. The demand for gas in Cork is almost stationary. If the company had been in any financial difficulty at the end of 1871 it is probable that this new work would not have been undertaken; but what has been done adds much to the efficiency of the works. The small yield of gas per ton of coal carbonized is due to two causes—the employment of Welsh coal and the use of a moderate temperature in carbonizing in order to keep up the illuminating power of the gas. As to the coal which it would be most advantageous to use at the Cork Gas-Works, there was a conflict of opinion between Mr. Denny Lane, the secretary of the company, and Mr. G. W. Stevenson, who appeared as a witness for the corporation. Mr. Stevenson advocated the use of Newcastle coal, which not only yields about 1000 cubic feet per ton of coal more than the Welsh coal, but also a better and less friable coke. On the other hand the cost of Newcastle coal at Cork is nearly half as much again as that of Welsh coal. The effect of the rise in the price of coal, which makes freightage relatively of less importance, and has doubled the value of coke, is undoubtedly favourable to the use of the better, but more costly coal, and therefore although I would not venture to pronounce with confidence which description of coal the Cork Gas Company ought to use, I shall base my estimate of the cost of production of gas, upon the results which appear to be attainable with Newcastle coal. In one respect, the manufacturing operations of the company appear to me to have been hitherto singularly defective. In 1872 the London gas companies made, on the average, 1s. per ton of coal carbonized by the sale of ammonia; the Ratcliff Company nearly 2s. The manufacture of sulphate of ammonia is so easy, and its value so considerable (about £18 a ton), that the value obtainable from this source at one large gas-works cannot vary greatly from that obtainable at another. At Cork no ammoniacal liquor was sold either last year or this, but a portion of it was used in the manufacture of sulphate of ammonia. This manufacture left in 1872, a profit of £173 10s., or 2·12d. per ton of coal carbonized, and in 1873 a loss of £28 17s. 7d. Among the new works erected by the company are new purifiers, washer, scrubber, and sulphate of ammonia apparatus. The latter appeared to be in satisfactory operation at the time of my visit. I shall estimate that the company can obtain from this source 1s. per ton of coal. The last and gravest objection urged against the management of the company relates to unaccounted-for gas. The volume of gas made in the year ending June 30, 1872, was 165·4 million cubic feet; the volume sold was 130·7 million; the volume unaccounted for was 34·7 million, or 20 per cent. In the year ending June 30, 1873, the volume of gas made was 169·2 million; the volume sold was 132·9 million; the volume unaccounted for was 36·3 million, or 24·4 per cent. The secretary and consulting engineer of the company explained this great deficiency, partly by attributing it to other causes than leakage, partly by giving reasons why the leakage in Cork should be above the average. The volume unaccounted for includes the gas burnt in the works, which was stated to be unusually large, owing to consumers meters being tested there. I would suggest that if this latter item is really considerable, air from a small gasholder would serve as well as gas to test the meters. Another cause, which, in Mr. Anderson's opinion contributes largely to the tale of unaccounted-for gas, is the reduction of temperature which the gas undergoes after leaving the station-meter. To form an accurate estimate of unaccounted-for gas, it would be necessary to know the mean temperature of the gas passing through the station-meter, and the average mean temperature of the gas passing through the consumers meters; but unless the former temperature was considerably the higher of the two, the apparent loss from this cause would be small. If, for example, the mean temperature of the station-meter were 60° Fahr., and the average mean temperature of the consumers meters were as low as 50° Fahr., every 1000 cubic feet of gas made would be returned as 981 cubic feet of gas sold, and there would appear to be 19 cubic feet, or 2 per cent. unaccounted for; and if anywhere gas enters the station-meter sensibly warm, and no correction is made for temperature, the result must be a considerable addition to the unaccounted-for gas. On the other hand, it might be found that the average temperature of the basements of houses, upon which that of the gas passing through the meters placed in them must mainly depend, is above that of the gas in the station-meter. The diminution of volume which may occur through the condensation of aqueous vapour, though a real quantity, is very trifling. As gas is commonly measured over water, and is conveyed through damp pipes, it is probably saturated with aqueous vapour both when measured in the station-meter and when measured in the consumers meters. If so, any difference of measurement from this cause would be such as is due to the tension of aqueous vapour at different temperatures. Supposing, as before, that the mean temperature of the station-meters is 60° Fahr., and the average mean temperature of the consumers meters is 50° Fahr., the decrease of volume due to the condensation of aqueous vapour is only 0·5 per cent. Two reasons were given why the leakage in Cork is so large. First, portions of the district consuming about one-sixth of the gas supplied lie at a considerable elevation, between 200 and 300 feet above the gas-works, hence undue pressure and leakage in the high-lying mains. Secondly, the consumption of gas per mile of main is small, amounting in value to only £600 per annum. The average amount taken by each consumer is also small, and the amount used for public lighting, which is registered on the average meter system, is kept down as low as possible. The principal leakage occurs at the junction of the service-pipes with the mains, and therefore the proportion of gas lost is larger as the average quantity of gas registered upon each service-pipe is smaller. On the part of the corporation, evidence was given by Mr. Stevenson to the effect that, except in a mining district, or where the traffic in the streets is excessively heavy, the unaccounted-for gas ought not to exceed 10, or, at most, 12½ per cent. The difficulty arising from the high level of a part of the district might, he considered, be surmounted by introducing street governors along the line of the rising main. In addition to the evidence laid before me at Cork by the engineers who appeared for the company and for the corporation, I have gathered information from various sources on the general question of leakage. The directors of the Cork Gas Company, as I understood, have made, or intend to make, a general testing of the gasholders and all apparatus on the works, and of the mains in several districts, so as to take steps to reduce the amount of gas lost. It should be possible, according to the best judgment I can form by these steps, and in particular by the introduction of street governors, to reduce the proportion of gas unaccounted for to 15 per cent. and probably lower. In estimating the earnings of the company, I have, therefore, taken 85 per cent. of the gas made as paid for by the consumers, instead of 78 6 per cent., the proportion sold during the last year. The amount of gas to be supplied I have taken as being the same as in the year ending June 30, 1873—viz., 133 million cubic feet. The demand increased a little during the half year ending Dec. 31, 1872, but during the succeeding half year it was less than during the previous corresponding period. To supply this volume of gas the company need to make 100·85 by 133 million or 156 million cubic feet. Mr. Anderson, founding his estimate on the use of Newcastle coal carbonized at a moderate heat, so as to yield 9000 cubic feet of 14-candle gas, reckons the cost of coal at 3s. 67 per 1000 cubic feet of gas. Mr. Stevenson proposes to get 9600 cubic feet of 14-candle gas from the same coal mixed with 6 per cent. of cannel, and estimates the cost for 1000 cubic feet of gas at 3s. 56. I shall probably commit no grave error, either on the side of the company or of the consumers, if I take the cost of coal per 1000 cubic feet of gas at 3s. 6d., and the volume of gas obtainable from a ton of coal at 9300 cubic feet. This gives, for the weight of coal required to produce 156 million cubic feet, 16,800 tons, costing £28,080. The outlay on labour, wear and tear, public lighting, salaries, rates, interest, &c., may, I think, fairly be taken at the same amount as last year—namely, £14,070.

From 16,800 tons of Newcastle coal the same number of chaldrons of coke may be obtained, of which one-fourth would be consumed on the works, and three-fourths sold. I estimate the price of this coke at 20s. a chaldron, the present price of coke from Welsh coal being 19s. 6d.; hence the sum realized by the sale of coke in one year would be £12,600. During the past year the price obtained for tar was 3d. a gallon, but only 34,000 out of 191,000 gallons were sold, another portion being used for gas making. It was stated as much as 3d. a gallon could not be got for a large quantity. I think it fair to assume that the whole quantity made may be sold at 2d. a gallon, or, if otherwise disposed of, is used to equal advantage. This gives a profit on 168,000 gallons of tar of £1400. Lastly, I estimate the sum that may be obtained by the sale of ammonia at £840. The account will then stand as follows:—

To Coal	£28,080
„ Working expenses, rates, and interest	14,670
	£42,750
Available for dividend	3,272
	£46,022
By Gas-rental, as last year	£28,109
„ Public lighting	3,073
„ Coke, tar, ammonia	14,840
	£46,022

The sum required to pay a dividend at the rate of 5 per cent. on the called-up share capital of £125,000 is £6250, which is less than the average amount of dividend earned in the two financial years next preceding the application. One penny per 1000 cubic feet of gas yields, on a make of 33 million, £554. An addition of 6d. to the present maximum price of gas would, therefore, according to the above estimate, bring the sum available for dividend up to £6596, and enable the company to make a dividend at the rate of 5 per cent. A proportionate increase of the yearly sum payable to the corporation for each public lamp would raise that sum from £4 to £4 8s. 6d. At the same time I desire to point out that the estimate here presented is of the company's working and earnings, as they might be, not of the financial position which, by due care and management, the company may expect to attain by the end of 1874. In particular, to reduce the leakage from 21·4 per cent. to 15 per cent. would require some time and a considerable expenditure. I send herewith copies of the directors reports and statement of accounts for the years 1868-1873, and some tables giving the quantities and price of the coal used, and of the gas and residuals made during each of those years; also two estimates of the company's position handed in to me by Mr. Anderson and Mr. Stevenson, also a copy of the *Cork Daily Herald* for Nov. 13, containing a report of the evidence given during the inquiry. I have the honour to be, sir, your obedient servant,

(Signed) "A. G. VERNON HARCOURT.

"The Secretary, Railway Department, Board of Trade."

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of this Board on Friday, Jan. 2—Colonel HOGG, M.P., in the chair,

The CLERK read a letter from the Home Office, transmitting copy of the Metropolitan Gas Bill, and requesting to be informed if this board is promoting the bill.

Major-General Sir WILLIAM CODRINGTON asked the chairman if that was so.

The CHAIRMAN said certainly not; the bill was not promoted by the board.

The clerk was directed to write to the Home Office, stating that the board were not promoting the bill.

Letters were also read from the vestries of Bethnal Green, Chelsea, Islington, St. George's, Hanover Square, St. Pancras, and Shoreditch; and from the district boards of Fulham, Holborn, and Lewisham, in reply to this board's letter of the 29th of November last; and a communication from the Commissioners of Public Baths and Wash-houses, St. Pancras, with reference to the proposal of The Gaslight and Coke Company and the Imperial Gas Company to increase the price of their gas.

The CLERK read a letter from the vestry clerk of St. George's, Hanover Square, inclosing a copy of resolutions adopted by the vestry at their meeting on the 1st inst., as follows:—"That the vestry having been informed by the Metropolitan Board of Works that The Gaslight and Coke Company intend to apply to the Board of Trade for the appointment of commissioners to revise the price of gas for the year 1874, the vestry resolve that they strongly object to any increase in the price of gas, as suggested by notices given by the company; and the vestry also resolve not to be bound by any proceedings or certificate of such commissioners, and that a copy of this resolution be sent to the Metropolitan Board of Works, the company, and the Board of Trade."—"That copies of this resolution be sent to the Corporation of London, the City Commissioners of Sewers, and every vestry and district board under the Metropolis Local Management Act."

On the motion of Mr. LESLIE, it was resolved that the communications be entered on the minutes.

Mr. LESLIE moved—"That the solicitor do give his opinion in writing as to whether the following words in the 4th section of the Metropolis Gas Act, 1860, have been repealed, and if so, by what statute the expression 'local authority' includes the Metropolitan Board of Works, vestries, and district boards appointed under an Act of the session 18 & 19 Vict., cap. 120, for the local management of the metropolis."

Mr. H. L. TAYLOR seconded the motion, which was put and carried.

A letter was read from the Phœnix Gaslight and Coke Company, intimating that the price of gas supplied by them will be 4s. 6d. per 1000 cubic feet from the 1st of June inst.

It was moved that the communication should be referred to the Works and General Purposes Committee.

Mr. LESLIE said the Phœnix Company were supplying very good gas, but they had no power to raise the price of gas without complying with the 1860 Act, which directed them to give notice of their intention to the local authorities.

Mr. W. NEWTON thought that Mr. Leslie was under a slight mistake. The 1860 Act gave this company power to raise their price as high as 4s. 6d. per 1000 feet without applying to the local authorities.

Mr. E. DRESSER ROGERS said that the Phœnix Gas Company were supplying very good gas for the price. Although only 12 candles, he questioned if it was not as good as the so-called 14 and 16-candle gas supplied by some companies.

The motion to refer the letter to the Works and General Purposes Committee was then agreed to.

ST. PANCRAS.—A "Gas-Consumers Protection Association" has been formed in this parish, and a meeting of its members was held in Camden Town on the 29th ult., to elect officers, &c. Mr. J. B. Kingston was appointed hon. secretary, and Mr. Churchwarden Salter, hon. treasurer. It was also resolved that Mr. Thomas Chambers, Q.C., M.P., be communicated with to ascertain whether he would accept the presidency of the association. Mr. Kingston read over a list of subscriptions received from gentlemen supporting the movement, and a number of persons in the room joined the association.

ST. GEORGE'S, HANOVER SQUARE.—A meeting of the vestry of this parish was held on the 1st inst., at which a letter was read from the Metropolitan Board, asking the vestry, with respect to the proposed revision of the price of gas supplied by the Chartered Company, to assist them in preparing evidence to be given before that commission against the proposed increase. A letter was also read from the vestry solicitors, stating that they had submitted this question to counsel for an opinion, and, as a preliminary step, it would be requisite for the vestry to pass a resolution strongly objecting to the proposed increase of price, and that the vestry will not be bound by any proceedings or certificate of the commissioners. Mr. Leslie moved that this resolution be passed, and copies at once sent to the Metropolitan Board, the gas company, and the Board of Trade. Mr. Rearden seconded the motion, to which Mr. Walker moved an amendment—"That the later part of the motion be omitted." Mr. James seconded the amendment, stating that during the last year the vestry had spent £700 in law expenses in fighting the gas company. The amendment was lost, as well as another moved by Mr. Dovey, to wait till the opinion of counsel was received, and the motion of Mr. Leslie carried.

ST. SAVIOUR'S, SOUTHWARK.—At the meeting of the vestry on the 31st ult., a letter was read from the Metropolitan Board of Works, asking for information relative to the price and quality of the gas supplied to the St. Saviour's district. Also for any information upon the gas and coal question which might be taken as evidence. It was resolved—"That the matter be referred to the General Purposes Committee." A letter was read from the Phœnix Gas Company, giving notice that from the expiration of the year the price of gas supplied by that company would be 4s. 6d. per 1000 cubic feet. Mr. Sutton wished to know whether 4s. 6d. per 1000 cubic feet would be the charge for the public lamps, because if it were so, the company were bound to give six months notice of their intention to increase the price. The chairman stated that the increase of price would only affect private consumers. The letter was referred to the General Purposes Committee, to report thereon.

A BOLD MAN.—Mr. W. Cunningham Glen has been moving in the Kensington Vestry for a commission to devise means for putting the making and management of gas into the hands of the metropolitan vestries! Mr. Glen is a distinguished official of the Local Government—late Poor Law—Board. He must surely wish to introduce into the lighting of London the great principle of which his board is such a master—"how *not* to do it." Looking to the state of the things already under the London vestries—in particular, scavenging and road repair—it seems a cool proposal to add gas lighting to the number. The result is less likely to be summed up in the old Latin motto, "*Ex fumo dare lucem*," than its converse, "*Ex luce dare fumum*." Considering what average vestrymen's prose is, it is surely too much to insist on making poets of them at once, by asking them to become masters of our metres. Perhaps Mr. Glen thinks that the vestries having, in their altercations, exhausted every species of retort—except the retort courteous—they should, in fairness, have our gas-retorts to fall back upon. Gas refuse is the most offensive of all refuse. But in the case of Mr. Glen's gas proposition, *Mr. Punch* can only say "refuse, by all means." If the gas *does* ever fall under the domain of the vestries, *Mr. Punch* offers them a motto from *Othello*—"Put out the light—and then!"—*Punch*.

METROPOLIS WATER SUPPLY.

The Registrar-General publishes the following returns of the average daily quantity of water supplied by the London water companies, for the month of November, 1873: according to their returns 110,814,481 gallons, or 503,481 cubic mètres of water (equal to about as many *tuns* by measure, *tons* by weight) were supplied daily; or 218·7 gallons (99·3 decalitres), rather less than a *ton* by weight, to each house, and 30·8 gallons (14·0 decalitres) to each person. According to returns of the London water companies made to the select committee on East London Water Bills (session 1867), it is estimated that, during the year 1866, about 82 per cent. of the total average daily supply of water for all purposes was for domestic use. Applying this proportion to the total quantity supplied daily in the month of November, 1873, it may be estimated that about 90,867,874 gallons were probably used for domestic purposes, or about 25·3 gallons per day for each inhabitant, against 23·8 in the corresponding month of last year. This proportion no doubt varies from month to month, but the Registrar-General has no means of giving a more exact estimate.

COMPANIES.	Number of Houses, &c., supplied in Nov., 1872.	Number of Houses, &c., supplied in Nov., 1873.	Aver. Daily Supply of Water in Gallons* during Nov., 1872.	Aver. Daily Supply of Water in Gallons* during Nov., 1873.
Total supply	499,973	506,792	103,160,394	110,814,481
From Thames	233,581	238,056	54,572,344	58,864,363
„ Lea and other Sources	266,392	268,736	48,588,050	51,950,118
THAMES.				
Chelsea	28,247	28,395	8,342,600	7,907,400
West Middlesex	44,032	45,217	8,989,377	8,941,474
Southwark and Vauxhall	79,033	79,512	16,459,794	19,006,250
Grand Junction	33,500	34,718	10,507,073	11,488,539
Lambeth	48,769	50,214	10,273,500	11,520,700
LEA AND OTHER SOURCES.				
New River	120,655	121,809	21,727,000	24,536,000
East London	104,196	104,481	20,431,000	21,177,598
Kent	41,541	42,446	6,430,050	6,236,520

* Including that for manufactures and for various purposes other than for domestic consumption.

Note.—The return for November, 1873, as compared with that for the corresponding month of 1872, shows an increase of 6819 houses, and of 7,654,087 gallons of water supplied daily.

Dr. Frankland, F.R.S., reports that, taking the amount of organic impurity in a given volume of the Kent Company's water delivered during December as unity, the proportional amount in an equal volume of the water supplied during that month by each of the other metropolitan companies was—New River, 1·4; Southwark, 2·8; West Middlesex, 3·0; Grand Junction and Lambeth, 3·1; Chelsea, 3·2; and East London, 3·5. All the river waters had been efficiently filtered, and were clear and transparent when drawn from the mains; the quality of the Thames waters exhibited in each case a marked improvement upon that which had been supplied during November, whereas the quality of the Lea water supplied by the East London Company had deteriorated.

The East London Water-Works Company have given formal notice to the Metropolitan Board of Works and to the Corporation of the City of London that they propose within the next six months to give a constant supply of water throughout the district or area bounded by and contained within imaginary lines drawn along the respective centres of the Bethnal Green Road, of Brick Lane, Spitalfields, of Osborn Street and High Street, Whitechapel, of High Street, Shoreditch, of Norton Folgate, of Bishopsgate Street Without, of Artillery Lane, of Sandys Row, and of Middlesex Street, and situate within the parishes of St. Matthew, Bethnal Green, Christ Church, Spitalfields, St Leonard's, Shoreditch, and St. Mary, Whitechapel, and the parishes or liberties of Norton Folgate, and the Old Artillery Ground, in the county of Middlesex, and the parish of St. Botolph Without Bishopsgate, in the City of London, or within some or one of those several parishes and liberties, except in respect of such houses, lands, buildings, and premises within that area which now take, or from time to time shall take, their respective supplies of water from the New River Company, or are beyond the district of the East London Water-Works Company. This extensive and densely populated area is divided into three sections, in the first of which the constant supply will commence on the 1st of May, in the second on the 1st of June, and in the third on the 1st of July.

LEEDS TOWN COUNCIL.

The Gas and Water Works Bill.

A Special Meeting of the Council was held on Thursday last—the Mayor (Alderman Marsden) presiding.

After some preliminary discussions, the council resolved themselves into a committee to consider the propriety of affixing the corporate seal to the bill, of which notice has been given for next session, for power to extend the limits of gas and water supply, to raise additional capital for water-works, to increase the price of gas, &c., &c.

Alderman George having moved that the seal be affixed to the bill, and that the town-clerk be instructed to take all necessary proceedings to promote the same,

Mr. Smith moved the omission of clause 3 in the bill, which refers to the extension of the water supply to the out districts, asserting that the committee had not yet provided an adequate supply in all parts of the borough.

Alderman George replied that, under the 3rd clause, power was taken only in the event of their having water to spare, after a full supply to the town, to sell the surplus to out districts, for the sanitary benefit of those districts and the profit of the corporation.

Alderman Joy said the want of a supply in some remote streets arose, not from there being a scarcity of water, but from the pipes being too small. In the bill borrowing powers were asked for a large sum to enlarge the mains where needful and extend the supply. Owing to the heavy interest payable upon the cost of the very extensive works now in progress, the net profit on the water had fallen from £12,000, which it was some years ago, to about £3750 last year, and next year it would probably have disappeared altogether; but he had no doubt that eventually, when the reservoirs were completed, a good profit would be again earned.

Alderman Barran thought a good deal of property in the borough was undervalued, and that this question required more attention.

Mr. Scarr said the valuation of property in the borough had increased £200,000 within the last few years, and the receipts had increased proportionately.

Mr. Mathewman, clerk to the Water-Works Committee, being appealed to, stated that in 1868 the sum collected was £38,700; in 1869, £42,663; 1870, £44,329; 1871, £47,000; and 1872, £49,322.

The amendment not having been seconded, fell to the ground.

In place of clauses 5 and 6 in the original draft of the bill, the following new clause was adopted:—"The water-rent shall be payable according to the actual amount of the annual rack-rent or value of the premises supplied, except in the case of dwelling-houses of not exceeding £10 nominal gross annual rent, the rates in respect of which shall be paid by the landlord, and in such cases then at a reduction of 25 per cent. upon such nominal gross rent as and by way of a compound allowance in respect to the burdens borne and defrayed by the owner, from and out of such nominal gross annual rental."

On the clause authorizing an increase in the price of gas from 3s. 9d. to 5s. per 1000 cubic feet,

Mr. Batley proposed that the price within the borough be increased to only 4s., and 5s. outside the borough. He was confident this increase would amply meet their requirements, as on all hands there were indications that the price of coal would come down.

Mr. J. Walker seconded the motion, and said that the gas now supplied in Leeds was made from inferior coal. With proper materials and better apparatus he had no doubt gas could be sold here for its present price at a good profit, but at present the consumers were supplied too often with inferior gas, which had a bad sanitary effect.

Mr. Lucas said it was easy to talk about the selection of coal, but last winter it was extremely difficult to get coal at any price, and once the chairman of the committee had told them that if a supply could not be got within three or four hours Leeds would be left in darkness.

Mr. Wilkinson, in supporting Mr. Batley's motion, complained of the Gas Committee having advertised an increase in meter-rents without first consulting the council.

Alderman Barran said there was no need for any alarm on the coal question, as he was sure that before long the price would be greatly reduced. New works were being opened out in all directions, and stocks were increasing very rapidly. He did not, therefore, think there was any occasion for the proposed increase in the price of gas. He thought the Gas Committee had made a mistake by announcing that they were going to raise the charge for gas-meters.

Mr. Wray, chairman of the Gas Committee, was of opinion that the proposed increase would be necessary, as coals now cost them 91 per cent. more than they used to do, the cost last year having been £45,000 more than in the previous year. With regard to meters, the corporation were losing money by them, and it was necessary to increase the rent. He believed that in another year the corporation would be able to make gas as cheaply as it was made in any large town.

After some further discussion the amendment was carried, but upon being put as a substantive motion,

Alderman Gallsworthy moved, as a further amendment, that the limit of charge for gas within the borough be fixed at 4s. 6d. per 1000 cubic feet, and 5s. 6d. outside the borough. Something over a 4s. limit would be required to meet the present loss.

Mr. Jackson seconded this amendment, remarking that he thought 4s. would be inadequate in the circumstances, whereas 4s. 6d. would be amply sufficient. It was not well to leave room for too large an increase, as the price usually remained at the higher figure. Was the price reduced when a profit of about £10,000 a year was made out of the gas? So in the future the committee would stick to the higher price and make any profits they could get. He objected to take £10,000 out of the pockets of the gas consumers in relief of the rates, just as he would object to taking a like amount from the pockets of the ratepayers in relief of the gas.

The amendment was put and carried by a small majority, and a formal resolution approving of the bill in its amended form was adopted by 48 to 4.

The approval of the council was asked by the Gas Committee to an expenditure of £14,000 for the purpose of remodelling the retort-house No. 2 at the Meadow Lane station. The chairman of the committee explained that the building in question was a dilapidated one, which belonged to the new gas company. It now contained about 250 retorts, but when the place was remodelled about 390 could be placed there, and a sum of about £400 a year saved.

Mr. Jackson pointed to a case of careless management and want of authority at the gas-works. An escape of gas being found at the junction of Meanwood and Chapeltown roads, the proprietor of the Sheepscar Foundry sent to the gas office for men to see to the matter. Men came, and after spending a good deal of time in taking off their coats and getting into form for work commenced to search for the escape. They dug a hole, but had not traced the escape when four o'clock struck, and then they said it was time for them to leave. The gentleman begged them to continue their search until they had discovered the leakage, but they declined, saying it was time for them to give up. They therefore shovelled the loose soil into the trench they had dug and went away. The consequence was that the escaping gas followed the course of the disturbed soil, which served as a kind of passage, and then followed the course of the gas-pipes communicating with the premises. The result was that six explosions took place in the kitchen, the place was set on fire, and the fire-engines had to be sent for. Then a second message was sent to the gas office, and men brought to remedy the escape.

Mr. Wray said the men had been cautioned on the subject, and would not in future cease work until they found any escape of which they were in search.

The recommendation of the Gas Committee was adopted.

LIVERPOOL (CORPORATION) WATER SUPPLY.

Report as to Prevention of Waste of Water, Restoration of Constant Service, and Waste Water Meters.

By George F. Deacon, Borough and Water Engineer.

The engineer has the honour to submit the following statement of the measures which have been adopted for the prevention of waste and the restoration of constant service in 14 districts selected for experimental purposes:—

The districts in question extend from Byrom Street and Scotland Road to Hatton Garden, Key Street, and Old Hall Street; and from Dale Street to Burlington Street. They comprise 5403 houses, and a population of 31,000 persons.

The first step taken in each district was to attach a meter to the main-pipe, in order to measure the quantity of water used. Readings of the indexes were, and are still, taken at six a.m. and six p.m. daily, occasionally during the night, and in some cases hourly. These readings form a useful and interesting record of the varying demands upon the water, the extent of waste, and the influence of operations for its prevention. After connecting a meter to a district, the conditions of supply were left unchanged until a fair average had been obtained of the consumption under the intermittent system; constant service was then introduced and continued without interruption for some time. These preliminary facts having been placed on record, measures for the prevention of waste were commenced, and the effect of each operation upon the consumption noted. Waste water inspectors were sent to examine carefully and describe in detail all the pipes and fittings in every house, and to ascertain the number of inhabitants. Night inspectors were employed to examine for external indications of waste, and by sounding stop-cocks to discover defects in pipes. The defects reported were vigorously followed up, and notices served where repairs devolving upon the owners or occupiers were required. In several of the streets special examinations of the sewers were made, and contributed materially to the detection of leakages.

The first efforts to diminish waste by external plumbing work were made in connexion with the fixing of stand-pipes in courts where the taps were inside of the houses, a measure participated in by the Health Committee on sanitary grounds. The separate taps were disconnected, the old, and generally light and defective pipes, supplying the taps, were taken up, and new piping was laid from the mains. In districts such as Henry Edward Street and Charters Street, where courts are numerous, the action produced material results; but it was found that branch pipes to trough closets, and to front houses adjoining the courts, which had not been interfered with, were constantly bursting, and it became necessary, in order to make the work in the courts effectual, to renew all those branches so as to clear away as much as possible of the old piping. This course has since been pursued systematically wherever stand-pipes have been laid. In districts where courts are comparatively few, the alterations in connexion with the erection of stand-pipes had very little influence in reducing the consumption.

During the progress of these works frequent leakages were discovered in the street pipes, both of lead and iron, which, throughout the districts, were known to be for the most part old and shallow. It was obviously important to place the corporation pipes in a sound condition while calling upon owners and occupiers to repair defects upon private property. An examination was therefore made of all the lead communication pipes, and, where necessary, they have been taken up and strong new pipes laid at a proper depth from the surface, while in several streets the iron pipes have been entirely renewed. At the same time stopcocks have been attached to each lead pipe, so that the supply can be controlled from the street, and the water at once shut off, in the event of a breakage, with very little inconvenience.

The renewal of street pipes has merely been the concentration at a particular time and the systematic performance of works which must in any event have been carried out in a short time.

The following statement shows the length of piping taken up and laid in connexion with the work already described:—

	Old Pipe taken up. Feet.	New Pipe laid. Feet.
In connexion with stand-pipes in courts within the 14 districts	39,267 ..	49,384
In connexion with stand-pipes in courts outside the 14 districts	10,851 ..	15,041
In streets, relaying service-pipes	14,934 ..	16,156
Total lead pipe	65,052 ..	80,581

The first item includes piping to trough closets and branches to front houses referred to above. The defects in the pipes, taken up were numerous. Their character, and the general condition of the piping, may be judged from the specimens which have been preserved, and may be seen at the engineer's office.*

Night Inspections.

Shortly after the fixing of the first district meter a system of night inspections was commenced, and proved to so productive in the discovery of leakages that it has been continued until the present time. There are two inspectors engaged upon the night duty, and they report an average of 15 cases per night. By means of the stopcocks they are enabled to hear even a slight trickling of water from a pipe or tap at a considerable distance. One inspector and two labourers are fully employed in following up and tracing during the day the cases thus brought under notice. So far the night inspectors have been confined entirely to the test districts. The following is an analysis of the reports received from them up to the 31st ult. The nature of the defects is given as ascertained by the subsequent day examinations:—

Cocks	345
Ball-cocks	103
Water-closets	223
Pipes	465
Trough water-closets	56
Taps left open	85
Stop-cocks	65
Stand-pipes	100
Hydrants, ferrules, plugs, &c.	61
Meters	4
Total	1507

Sewer Examinations.

In four of the districts where considerable waste from the street pipes was believed to take place, useful results have been obtained by night examinations of the sewers. When the ventilation and cleansing of the sewers has been completed, systematic and periodical examinations may be made, and there is no doubt such a course will lead to the discovery of a great deal of waste which now takes place unperceived.

House-to-House Inspection.

Until recently two inspectors have been employed, with the occasional assistance of others, in house-to-house visits for the examination of fittings in

* Full particulars of the cost of these operations were given in the engineer's report of the 21st of October, 1873, on the expenditure in connexion with the erection of stand-pipes and the prevention of waste of water.

these districts. Returns have been prepared which show the number and character of the various kinds of taps and fittings in every house. Where slight defects have been met with, the inspectors have themselves effected the necessary repairs; but where the defects have been of a more serious description, the usual notices have been served on the persons responsible.

A source of waste deserving of special mention is an arrangement, which is, unfortunately, very common in these districts, of flushing water-closets by means of a simple tap and a pipe laid direct from the main or from a supply cistern; scarcely less objectionable are cisterns containing only single valves. The taps or valves are frequently left open, and large volumes of water flow to waste. Although the tenants are usually careful to close the taps or valves when the inspectors are near, no fewer than 88 such taps have been found open. The course adopted has been to cut off the supply, and serve a notice upon the landlord or tenant to provide a double-valve cistern of approved pattern.

The following table is a summary of the defects discovered by the waste water inspectors in each of the districts, from the time of fixing the meters until the end of October:

Title of District.	Notices Issued for Defects.					Repairs Effected by Inspectors.					Total Noticed and Repaired.
	Cocks.	Ball Cocks.	Water Closets.	Pipes.	Total.	Cocks.	Ball Cocks.	Water Closets.	Pipes.	Total.	
Henry Edward Street	31	5	9	118	163	2	—	5	—	7	170
Charters Street	55	12	25	95	187	8	3	—	—	11	198
Hatton Garden	72	30	91	131	324	30	20	7	3	60	384
Bispham Street	26	—	6	66	98	6	2	1	2	11	109
Cockspur Street	47	30	54	126	267	45	10	11	5	71	338
Gascoyne Street	82	8	30	63	183	9	4	5	1	19	202
Plumbe Street	75	19	81	106	281	32	5	7	—	44	325
Leeds Street	25	3	16	41	85	6	—	1	—	7	92
Banastre Street	33	7	24	58	122	10	2	5	1	18	140
Midghall Street	33	4	30	46	103	21	1	1	—	23	136
Burlington Street	96	11	101	189	397	37	4	3	—	44	441
St. Paul's Square	43	20	12	30	105	4	—	2	—	6	111
Harrison Street	89	21	61	117	288	33	10	11	12	66	354
Paul Street	16	—	4	49	69	6	—	—	2	8	77
Total	713	5	555	1232	2665	253	58	55	28	394	3076

House Meters.

In order to ascertain the consumption under various circumstances, special meters have been attached to houses of different classes, and the results have been tabulated. The following instances will illustrate the value of this proceeding.

A meter was fixed at a house in Great Crosshall Street, assessed at £25. The consumption was found to be at the rate of 46 gallons per head per day. An inspection of the fittings was made, and all appeared to be satisfactory, but a closer examination resulted in the discovery that the valve of the water-closet cistern (one of the old form) was out of order, and that water was flowing almost noiselessly down the overflow-pipe into the drain. The leak was stopped, a new cistern obtained, and the consumption reduced to 7½ gallons per head per day.

In Johnson Street, at a lodging-house assessed at £10, the consumption was found to be very variable, ranging from 70 to 7 gallons per head per day. This variation and excess were attributed to the fact that the water-closet was supplied from a common tap, although it was never found to be actually open. The landlord was requested to erect a proper cistern, did so, and the consumption at once became steady at a rate of about 12 gallons per head per day.

Office Supplies.

In connexion with this subject reference may be made to meters recently attached to three blocks of offices outside of the test districts—viz., the Queen's Insurance Buildings, Walmer Buildings, and Brown's Buildings.

The first readings of the meters showed that water was being used at the following rate:—

Queen's Insurance Buildings, about 80 gallons per head per day. Walmer Buildings, about 23 gallons per head per day. Brown's Buildings, about 32 gallons per head per day.

The undue consumption appears to arise chiefly from the urinals and water-closets. On examination the fittings were found to be generally in good order, but of a very wasteful character. The presence of the inspectors exercised a wholesome influence, and the consumption has been considerably reduced, but continues to be far more than it ought to be. The average extending over 41 days has been—

In Queen's Insurance Building . . 21½ galls. per head per day.
In Walmer Buildings . . . . . 13 " "
In Brown's Buildings . . . . . 20½ " "

It must be remembered that most of the persons included in this calculation are only day tenants, and consume water at their residences in addition to what is used in their offices.

Results Obtained in Test Districts.

Having given an outline of the measures adopted for the prevention of waste, it now remains to show their effect on the consumption of water. The following statement gives—1. The quantity used per head per day under the old intermittent system of eight to ten hours daily supply. 2. The quantity used when the districts were first placed on constant service. 3. The present consumption with constant service.

The figures are averages of several days:—

No.	District.	Population	Former Intermittent Supply.	Former Constant Supply.	Present Constant Supply, Average for Week ending Nov. 17.
1.	Henry Edward Street.	2134	18	35	6·6
2.	Charters Street	2285	14½	24	13·66
3.	Hatton Garden	2974	23	40	19·19
4.	Bispham Street	1540	11½	19	13·37
5.	Cockspur Street	967	22½	38½	14·39
6.	Gascoyne Street	1534	18½	33	11·46
7.	Plumbe Street	2570	31	55	17·28
8.	Leeds Street	827	17½	45	13·51
9.	Banastre Street	1824	14½	26	10·27
10.	Midghall Street	1826	20½	29	10·77
11.	Burlington Street	5798	18½	28	12·85
12.	St. Paul's Square	899	24½	37	17·54
13.	Harrison Street	3399	18½	33	12·77
14.	Paul Street	838	24	41	10·74
	Average		19·59	33·55	13·32

The average saving in the districts as they at present stand is therefore—

	Gallons per Head per Day.
From former Intermittent Service = 194,407 gals. per day, and to 71,000,000 gals. per annum.	6·27
From former Constant Service = 627,251 gals. per day, and to 229,000,000 gals. per annum.	20·23*

* The value at 9d. per 1000 gallons of the water saved between former intermittent and present constant service is £2662 per annum, and between former constant service and present constant service £8587 per annum.

Conditon of the Street Pipes.

By closing the stopcocks on the lead service pipes, and preventing all use of water in the district, it is evident that any water passing through the meter must be flowing to waste under the streets. This test has been applied in twelve of the districts, with the results stated below:—

District.	Stopcocks shut and Taps tied.	Lowest reading. Rate per Hour. Gallons.	Rate per Head. per Day.
Henry Edward Street	February 3	180	2·0
Do.	April 25	80	·9
Charters Street	February 13	288	2·7
Do.	October 28	486	5·0
Hatton Garden	April 2	1140	12·5
Do.	May 29	750	7·0
Do.	November 7	411	3·83
Bispham Street	—	22	0·34
Cockspur Street, reduced district	—	Meter stopped.	All tight.
Gascoyne Street	June 17	240	3·75
Do.	October 28	Experiment repeated, but interrupted, and results not satisfactory	
Plumbe Street	October 14	405	3·8
Leeds Street	April 16	146	4·35
Do.	October 14	55	1·6
Banastre Street.	July 2	96	1·26
St. Paul's Square	June 11	340	9·0
Do. half district	October 28	48	2·3
Harrison Street.	August 27	360	2·5
Paul Street	June 17	42	1·2

Night Readings.

Readings of the meters are taken by the night inspectors in the districts where they are engaged, and give excellent indications of the extent of waste by showing what quantity of water is being used at a time when cisterns ought to be full and the inhabitants at rest. Subjoined is a statement of readings at various dates:—

Water passing through the District Meters between the Hours of One and Four o'clock a.m.

District.	Former Night Readings.		Lowest Night Readings.		Latest Night Readings (Special).	
	Date.	Rate per Head per Day. Gallons.	Date.	Rate per Head per Day. Gallons.	Date.	Rate per Head per Day. Gallons.
1. Henry Edward Street.	February	23·0	July	0·75	Oct. 27	2·7
2. Charters Street	February	18·0	—	—	Oct. 25	8·6
3. Hatton Garden	April 3	28·0	July 5	11·0	Oct. 29	10·0
4. Bispham Street	May 16	17·2	July 26	4·5	Oct. 27	6·7
5. Cockspur Street	June 2	23·7	Aug. 25	4·0	Oct. 25	7·1
6. Gascoyne Street	June 14	21·7	July 8	3·0	Nov. 25	7·5
7. Plumbe Street	May 13	20·0	Oct. 22	10·3	Nov. 20	7·0
8. Leeds Street	June 27	11·6	Aug. 1	3·4	Oct. 28	5·2
9. Banastre Street	June 17	10·5	July 4	3·1	Oct. 27	5·2
10. Midghall Street	July 7	4·0	Oct. 16	4·7	Nov. 26	2·8
11. Burlington Street	July 16	18·2	Oct. 10	5·96	Oct. 10	5·9
12. St. Paul's Square	June 20	18·7	Aug. 15	11·0	Nov. 19	10·7
13. Harrison Street	June 18	14·5	Sept. 11	3·3	Nov. 25	5·8
14. Paul Street	May 21	17·1	Sept. 10	2·9	Oct. 28	3·7

The "rate per head per day" shows what the consumption would be in 24 hours, assuming it to continue at the same rate as when the observations were made.

Principal Sources of Waste.

The several operations described have afforded valuable evidence of the causes of waste, and the most effectual means of preventing it. From the daily records which have been kept of the consumption the results obtained under various conditions and circumstances can be compared, and any increase or decrease in the quantity used during the day or night may be immediately seen.

It has been found that the leakage from street pipes bears only a small proportion to the total waste. Although many of the distributing mains are very old, worn, and corroded, and break on the least disturbance, the number of actual defects discovered in them has been few.

The chief sources of waste have proved to be private pipes and fittings. Nearly all the private piping hitherto examined has been found too light for the ordinary pressure, and often in a very bad condition, unskilful attempts have been made to repair defects, while joints of imperfect and unsound character, cisterns and taps of faulty construction, and water-closets without proper regulating apparatus, have been very general. After the alterations that have been made in compliance with waste water notices, there are still in these 14 districts 852 water-closets, and about 2000 taps, which are contrary to the present regulations. There are 275 water-closets supplied by common taps, 239 water-closets supplied by single valves, and 338 by old regulating cisterns. The corporation have at present no power to order the removal of such objectionable fittings except when they are seen to be actually wasting water. In such cases care is taken that the regulations are strictly complied with. By vigilant inspection a great deal has been done in this direction, and it is mainly to these efforts that the reduction in consumption is due. In the districts where the greatest number of alterations in private pipes and fittings have been made the minimum consumption has been reached. Henry Edward Street district has been more thoroughly dealt with than any of the others; 219 taps have been taken out of the cellars of courts and adjoining front houses in favour of self-closing stand-pipes. The result is that the consumption is very low and very steady. For the past three months the average daily quantity used has been at the rate of 8·47 gallons per head, and for the last month the average consumption has been 6¾ gallons per head per day. As a contrast to Henry Edward Street the district known as Plumbe Street shows the increased difficulty of overcoming waste where the same sweeping changes cannot be made. The courts being much fewer, the proportion of renewals effected by the corporation men on private property has been correspondingly smaller. The number of objectionable water-closets here is 139.

It is also to be observed that in districts containing houses of a better class, and where there are many business premises, as in Plumbe Street and Hatton Garden, the consumption is invariably higher than in a low-class district. A considerable quantity of water is used for trade purposes and for horses, which is included in the consumption per head given in the table, and must be allowed for when a comparison is made.

The stand-pipes do not of themselves appear to have had much influence in diminishing waste. In a district (Paul Street) where the courts were supplied by means of common taps the average consumption was about the same as in districts where stand-pipes had been erected. The Paul Street district has within the last month been similarly treated, and no marked change in the consumption produced, excepting that the variations from day to day are less, which is doubtless owing to the stand-pipes being self-closing, and the waste, consequent on a tap being occasionally left open, stopped.

Waste Water Meters.

About 18 months ago a plan was prepared showing the division of the borough of Liverpool into 300 districts, the whole of the water-fittings in each of which were commanded by a single service main.

It was at that time suggested that if the water in each such main were caused to pass through a meter, the various steps for the systematic reduction of waste might be proceeded with in the most economical and efficient manner. It was believed that when once the districts had been reduced to a proper rate of consumption, that rate could without difficulty be maintained by systematic reading of the meters, and by sending into the districts in which the consumption had unduly risen the waste water inspectors who formally spent their time equally on good and bad ground. The cost of the meters would, however, have been very great, and the actual saving capable of being effected by them was not at that time understood.

It was therefore decided to try the experiment at first with 14 districts.

The value of the results has far surpassed the most sanguine expectations, as the figures already quoted show, and it may be safely stated that such results could not have been obtained without the meters.

The great cost of the ordinary piston meters, and the fact that, although they register the total quantities between any two observations, they do not register the quantity passing through the mains at any required time when an observation is not being made, induced the engineer to give his attention to the design of a meter which could be constructed at a small cost, and which would fulfil the special objects of a waste water meter.

The four-inch meter designed for this purpose has the following properties:—

1. It can be constructed for less than one-fifth the price of the piston meters at present in use.
2. It can be fixed, including the cover, for less than one-seventh the cost of chambers, and fixing for the ordinary meter.
3. It is absolutely self-registering—that is, it registers on a diagram the quantity of water flowing through the main at every moment instead of the total quantity between any two observations. The minimum night reading in such a diagram is especially useful, as it indicates almost exactly the quantity of waste. Such information can only be obtained from an ordinary meter—and then but indifferently—by watching and counting the strokes during the night.
4. It distinguishes the variable waste due to taps and other watter fittings left running from the comparatively constant waste due to leaks in pipes.
5. A single diagram may be taken for any required length of time up to seven days, and when applied to a district of 1000 to 2000 persons it indicates distinctly the closing and opening of every separate tap. It is, moreover, equally sensitive at high and low velocities.
6. It may be safely stated that its accuracy is much less liable to change than that of a meter constructed on the principal of direct quantitative measuremont, because it depends chiefly upon the accuracy of the dimensions of certain fixed parts, and not upon the maintenance of the accuracy of the joints of moving parts, or upon the condition of cup leathers or other packing, as is usually the case.
7. The meter does not present the usual and objectionable obstruction to the motion of the water, the reduction of pressure probably never exceeding four or five ounces per square inch.

Additional Districts under Test.

Two districts have been commanded by waste water meters for a sufficient time to show the value of their indications in practice. One of these includes the greater part of the Exchange Buildings, Hackins Hey, William Street, Tempest Hey, and Tithebarn Street between Moorfields and Exchange Street. The district consists principally of offices, and contains a population of

263 residents.
1110 non-residents who consume water elsewhere.

1373 total.

The diagram being left on for three days before any intimation had been given to the consumers, gave the following results:—

	Gallons per Head per Day. (Constant Service.)	Average Rate during the Night.
October 4th—5th	58·4	50·4
„ 5th—6th	59·5	52·44
„ 7th—8th	59·7	50·0
Average	59·0	50·95

After the census of the district had been taken, and some superficial repairs made, the day reading came down to 26, and the night reading to 15 gallons per head. It is not for a moment to be supposed that this great change was brought about by the few repairs made; on the contrary, there is every reason to believe that it was due chiefly to the greater care exercised by keepers and others in closing taps at night, after the visits of the waste water Inspectors. Indeed, the details of the diagrams confirm this view. The saving in this case would probably not continue long, unless regulating cisterns were substituted for the present apparatus.

Operations Outside the Test Districts.

When the re-piping work had been completed in the 14 districts mentioned, it was necessary, in order to avoid breaking up the staff, to employ the men in a similar manner in districts unprovided with meters. This course is by no means satisfactory, as the result of the operations cannot be tested. The engineer, therefore, strongly recommends that meters be applied at once to a sufficient number more of the service mains to avoid going over the ground twice.

Conclusion.

The average domestic consumption of water in Liverpool under the intermittent system is about 24 gallons per head per day.* In the first 14 districts of low-class property that average was 19·59, and yet constant supply has been given, and the consumption reduced to 13·32, or more than ten below the general average.

On the other hand, the tests on office property have shown that the consumption is much above the average, notwithstanding the fact that more than three-fourths of the people use water elsewhere. In the Exchange district already mentioned the average intermittent consumption was about 6 gallons above the general average, and was easily converted to constant service, and reduced to only one above that average.

Isolated meter tests, conducted in districts containing a better class of dwelling-houses, have indicated that the consumption is equal to about the general average, and this might reasonably be expected from the averages in the two first classes.

Hitherto, then, the results have been eminently satisfactory, and there is every indication that as different classes of property are reached they will become even more so, although, until the proposed parliamentary powers are obtained, there must always be a very large amount of waste, and a great expenditure in only partially successful efforts to keep it down.

Water Engineer's Department, Nov. 11, 1873.

* This includes all water used from the service mains, except that sold by meter measurement for trade purposes.

LECTURES BY PROFESSOR TYNDALL "ON THE MOTION AND SENSATION OF SOUND."

On Saturday, Dec. 27, Professor Tyndall gave the first of a course of six lectures, addressed to a juvenile auditory, at the Royal Institution, London, taking for his subject the propagation of sound. Having described how the motion of sound had been demonstrated to be at the rate of five seconds per mile by observers out at sea accurately noting the time which elapses between seeing the flash and hearing the sound of a gun fired on the shore, he stated that it had been proved that when the air is at the temperature of freezing, the velocity of sound through it is 1090 feet a second, while light passes over the distance of 188,000 miles in the same time. The velocity of sound increases as the temperature rises; in the lecture theatre it was about 1100 feet a second. The lecturer next exhibited some of the properties of air, the vehicle of sound. With regard to weight, he stated that the pressure of the air upon a square foot of his table, or a sheet of india-rubber, was nearly a ton, this great weight being sustained by the pressure being equal on all sides. A bladder from which the air was drawn off by the air-pump collapsed, and when the pressure of the air outside a bladder containing a little air, was removed, the air within immediately expanded through its particles repelling each other. This was also illustrated by an ingeniously-devised model composed of a series of balls, separated by springs. When a sharp stroke was given to a ball at one end the motion was communicated through the series, the springs successively contracted and expanded, and a sound was heard at the other end. In like manner we must figure the propagation of sound. The noise of an explosion is propagated as a wave or pulse through the air. This wave, consisting of two parts, in one of which the air is condensed and in the other rarefied, strikes upon the tympanum of our ear and causes it to shiver; tremors are transmitted along the auditory nerve to the brain, where the wave announces itself as sound. The value of the speaking-tube was explained to be due to its preventing the divergence of these waves. After several striking illustrations, the lecturer showed that the shock which will produce a sound-wave in air will not produce it in hydrogen, the lightest of gases, while in a vacuum sound is not propagated at all. When air was admitted into the exhausted receiver of an air-pump, sound was once more perceptible. He then proceeded to prove to the eye that sound may be reflected like light, the angle of incidence being equal to the angle of reflection, for which purpose he employed a gas-flame, which he showed to be extremely sensitive to sounds, such as chirruping, the rattling of money, and even the ticking of a watch. In experimenting with the delicate waves of light he required a mirror, but with the larger waves of sound a board covered with paper was sufficient for the reflective surface, and the dancing of the sensitive flame demonstrated the reflection of the sound as soon as it was produced. Other most interesting phenomena were exhibited by means of curved mirrors, the electric light, and other apparatus; and it was shown that sound has what may be termed a shadow as well as light.

The second lecture was delivered on Tuesday the 30th ult. The lecturer commenced with illustrated explanations of the nature of waves of sound, as compared with water waves. The propagation of a wave he showed to be merely the propagation of a form. The particle of water which at one moment occupies the crest of the wave is immediately afterwards in the furrow of the wave, whence it rises again to occupy for a moment the crest of the succeeding wave. Each particle has an up and down motion. Water waves were described as transversal, and sound waves as longitudinal. The lecturer contrasted the sounds produced by shaking pieces of potteryand coal in a box with the grand tone given by a large tuning-fork. The former, mere noise, he attributed to an irregular succession of sonorous shocks; the latter, a musical sound, to sonorous shocks following each other at regular intervals with a sufficient rapidity of succession. After showing rings and lines of light produced by rapid motion of any source of light, and attributing them to persistence of the image of the light on the retina of our eyes, the lecturer stated that musical sound depends on the continuance of the vibrations concerned in it production. By placing a small mirror on the prong of a tuning-fork, and causing a slender beam of the electric light to pass through a converging lens and then fall on the mirror, the beam was thrown back by reflection, and by means of a small looking-glass a luminous disc was projected on a white screen. When the fork was excited by a fiddle-bow sinuous lines of light were produced. For this beautiful method of giving optical expression to sound, of which several examples were given, we are indebted to M. Lissajous. The lecturer stated that a musical sound may be produced by a rapid and regular succession of taps, such as those of a card against the cogs of a rotating wheel, to illustrate which, he selected, as an interesting example, the shrill tones produced by the rocking of a piece of hot brass upon a piece of lead, attributed by Faraday to the alternate expansion and contraction of the cold metal at the points where the hot rocker descends upon it. He next showed, by means of a disc of zinc perforated by holes, how a musical sound may be produced by a succession of puffs of air; and then explained the construction of the "syren," an instrument by which such puffs may be generated. This instrument, the invention of Cagniard de la Tour, has been greatly improved by Dove and others, but especially by Helmholtz; and now, by means of clockwork and a dial attached to the syren, the rate of vibration of any sounding body may be accurately determined. It is only necessary to bring the sound of the syren into unison with the other sound, and the number of vibrations per second is given on the dial. The pitch of a musical note depends solely on the number of vibrations concerned it its production; the more rapid the vibrations the higher the pitch.

Gas Explosion at Hove.—On Saturday evening, December 27th, an explosion occurred at the hotel attached to the Sussex County Cricket Ground, Hove. It appears that some gas-fitters had been at work in the house, and that a plug had been placed in a pipe in the coffee-room, which, from some cause or other, had become dislodged. A smell of gas prevailing, Mr. Juden turned off the supply from the main; and then, thinking everything safe, he was about to enter the coffee-room with a light. The room being full of gas, a loud explosion followed, and Mr. and Mrs. Juden were severely injured by splinters of wood and pieces of broken glass. Extensive damage was also done to the room and other fittings in the bar.

Lighting of Common Stairs at Dundee.—A joint meeting of the Lighting Committee of the Police Commission, the Works Committee of the Gas Commission, and the Committee of the House Proprietors, regarding the lighting of common stairs, was held on the 23rd ult. After hearing Mr. Haggart on behalf of the house proprietors, and a very elaborate statement from Mr. M'Crae as to the actual cost of lighting common stairs in Dundee, the following arrangement was come to:—1. That the Lighting Committee of the Police Commission recommend the commission to fix the hours of lighting common stairs for which proprietors and tenants are to pay, to be from sunset till twelve midnight. 2. That the Works Committee of the Gas Commission recommend that commission to light and put out the jets at 4s. 2d. per jet per year, and estimate the cost of the light at 6s. 6d. per jet per year, including meter-rent; if the meter shows that more has been burned, that the proprietor has to pay extra, and if it shows that less has been burned, that he has to pay correspondingly less, but in all cases the proprietor is to be responsible for the whole expense to the Gas Commission. 3. That the Committee of the House Proprietors recommend to all the owners of common stairs in the town to agree to the foregoing terms.

NEW JOINT-STOCK COMPANIES.

Brought out during the Year ending December 31, 1873.

(From Messrs. Spackman and Sons Tables.)

Name of Company.	Capital Authorized.	Capital Offered.	Amount of Share.	Deposit.	Total Deposit.
	£	£	£ s. d.	£ s. d.	£
Barbadoes Gas (L.)	100,000	70,000	5 0 0	3 0 0	42,000
Beyrout Water-Works (L.)	500,000	250,000	20 0 0	5 0 0	62,500
Cash Indicating Gas-Meter (L.)	30,000	15,000	1 0 0	1 0 0	15,000
Coal Economizing Gas (L.)	300,000	45,000	10 0 0	3 0 0	13,500
Coal Gas Improvement (L.)	100,000	50,000	5 0 0	2 10 0	25,000
Colne Valley Water	100,000	100,000	10 0 0	2 10 0	25,000
Diamond Fuel (L.)	200,000	84,000	5 0 0	2 0 0	33,600
Gas & Water Debenture Trust (L.)	2,000,000	1,000,000	20 0 0	4 0 0	200,000
Gas Consumers Apparatus (L.)	50,000	25,000	5 0 0	2 0 0	10,000
Kidwelly Dinas Fire-Brick (L.)	15,000	6,000	2 0 0	0 10 0	1,500
New Gas (L.)	500,000	175,000	5 0 0	3 0 0	105,000
St. Day Fire-Brick (L.)	25,000	12,000	10 0 0	5 0 0	6,000
Silber Light (L.)	120,000	80,000	10 0 0	4 0 0	32,000
Treoarth Fire-Brick, &c. (L.)	30,000	30,000	3 0 0	1 10 0	15,000
Wolsingham Park Fire-Brick, Mineral, and Coal (L.)	70,000	70,000	10 0 0	4 0 0	28,000

NEW ISSUES OF CAPITAL DURING 1873 BY COMPANIES PREVIOUSLY EXISTING.

Name of Company.	Capital Offered.	Number of Shares.	Amount of Share.	Called up per Share.	Amount Called up.
	£		£ s. d.		£
Cadiz Water-Works (L.)	79,550	7,955	10 0 0	All.	79,550
Foreign and Colonial Gas (L.)	75,000	7,500	10 0 0	£3 per Share	22,500
Odessa Water-Works (L.)	200,000	10,000	20 0 0	All.	200,000

THE COAL TRADE OF 1873.

The following statistics of imports and exports of coal into and from the port and district of London, by sea, railway, and canal, during the year 1873, have been published by Mr. J. R. Scott, the Registrar of the London Coal Market.

IMPORTS.

By Sea.	Ships.	Tons.	*By Railway and Canal.*	Tons.	Cwt.
Newcastle	2,205	1,439,820	London & North-Western	1,046,920	10
Seaham	211	93,134	Great Northern	1,037,286	0
Sunderland	992	627,958	Great Western	661,341	17
Middlesborough	44	15,671	Midland	1,655,962	0
Hartlepool	659	238,348	Great Eastern	693,152	0
Blyth	9	5,268	South-Western	34,697	11
Scotch	305	69,486	London, Chatham, & Dover	5,670	2
Welsh	62	18,857	South-Eastern	12,383	12
Yorkshire	661	122,540	Grand Junction Canal	11,195	0
Duff	4	1,250			
Small Coal	134	19,163			
Cinders	70	13,099			
Culm	3	1,086			
Total	5,359	2,665,680	Total	5,158,608	12
Imports during the year 1872	4,954	2,548,918	Imports during the year 1872	5,007,504	19

EXPORTS.

Export list, showing the distribution of coal imported into the port or district of London by sea, rail, and canal, and afterwards exported coastwise or to foreign parts, or sent beyond limits of London district, by rail or inland navigation, during the year 1873:—

	Tons.	Tons.
Railway-borne coal passing "in transitu" through district		779,926
Sea-borne coal exported to British Possessions, or to foreign parts, or to the coast	486,050	
Ditto, sent beyond limits by railway	105,066	
Ditto, by canal and inland navigation	23,736	
		614,852
Railway-borne coal exported to British Possessions, or to foreign parts, or to the coast	308,634	
Ditto, by rail beyond district	727	
Ditto, by canal and inland navigation	4,077	
		313,438
Sea-borne coal brought into port and exported in same ships		12,127
Total quantity of coal conveyed beyond limits of coal duty district during the year 1873		1,720,313
Ditto, during the year 1872		1,655,733

Comparative Statement, 1872 and 1873.

By Sea.	Ships.	Tons.	*By Railway.*	Tons.	Cwt.
Jan. 1 to Dec. 31, 1873	5,359	2,665,680	Jan. 1 to Dec. 31, 1873	5,158,608	0
Jan. 1 to Dec. 31, 1872	4,954	2,548,918	Jan. 1 to Dec. 31, 1872	5,007,504	0
Increase in the present year	405	116,762	Increase in the present year	151,104	0

EXPORTS.

Comparative Statement, 1872 and 1873.

	Tons.
Total distribution of coal from Jan. 1 to Dec. 31, 1873	1,720,343
Total distribution of coal from Jan. 1 to Dec. 31, 1872	1,655,733
Increase in the present year	64,610

General Statement, 1872 and 1873.

	Tons.	Tons.
Increase in coals imported by sea during the present year	116,762	
Increase in importation by railway	151,104	
		267,866
Deduct increase of coal exported		64,610
Total increase in trade within the London district during the present year		203,256

Review of Coal Trade, 1873.

So far as the coal trade of London is concerned, the year just closed (1873) has been extraordinary, and it is to be hoped exceptional in character.

During no period since the introduction of the railway system into London has the price of coal risen above 50s. per ton, a point reached in February last, while a somewhat lower price has been maintained more or less for many months.

There can be no question that this exceptionally high price must, in London, have interfered with coal-consuming manufacturing interests, but probably not to the same extent as in the provinces and coal-producing districts, inasmuch as the greater demands for iron purposes have, *inter alia*, caused a comparative higher range of prices in those localities than in the metropolis, although geographically remote from our colliery districts.

This extraordinary but universal rise may be attributed to the following causes:—

1. To the recent activity in the demand for iron all over the world.
2. To the increased cost in getting coal consequent on the vast increase in mining labour in connexion with a diminished output, and contributing alike (at all events, for the moment) to the material interests of masters and men.
3. To the increased cost of machinery, timber, &c., in use in colliery operations.

But taking the above yearly statistics into account, it would appear that London has but little cause to complain of a diminished supply, looking to the fact that both by sea and railway a comparatively large increase is observable over last year's imports, while, on the other hand, the increase (in a comparatively decreasing ratio) of exports and deliveries by railway beyond the London district of 15 miles from the City show a greater falling off than has occurred for many years, due, doubtless, to price and the difficulty of getting coal by railway through London to districts remote from the metropolis in the south and south-eastern districts of England. It is, however, fair to state that the growth of the railway trade in coal through London to districts beyond to the south, &c., has hitherto of late years made extraordinary strides, to the interests alike of the coal-consuming public and railways serving the counties south of the Thames.

In the face of the difficulties of price and supply during the last year it is a matter alike of astonishment and congratulation that the supply has been so comparatively well maintained in London.

But it would be idle, in the face of the great increase in the cost of getting coal, to expect that we shall ever again see the prices of 1870 and 1871, but the opening up of something like 30 collieries in various parts of England and Wales during the last year should in course of time tell its own tale of increased supply, although it is feared that among other results will be the importation into London of an inferior class of coal unknown to the London coal trade 20 years ago.

Among other signs significant of the times during the past year has been the attempt at the introduction into London of peat fuel, intending to compete with coal in its various uses. This useful innovation has been brought about by the unreasonably high price of coal, and an opinion is entertained that under intelligent management this fuel may be made at such a cost and with such results as profitably to compete with coal.

One peat company of native origin, and two of foreign introduction, have addressed themselves to British capitalists during 1873. It is much to be hoped, in a national point of view, that during the present year the peat manufactured in this country by these pioneers for the public benefit, should not alone find distribution in the immediate neighbourhood of its manufacture, but that the public in London (whose mind is at present indifferent to this subject) should have the opportunity of deciding on its merits or demerits.

There are six millions of acres of peat bog in the United Kingdom. Why not utilize them as in Bavaria, Austria, France, Russia, Hanover, and elsewhere in both hemispheres, where peat fuel now supplies profitably every use to which coal is adapted?

STREET PAVEMENT.—A new street pavement has been tried in San Francisco. It is called "hydrocarbolized brick," and is made of bricks of a soft porous nature, which are boiled in coal tar, which, it is said, renders them tough, and nearly as hard as granite. A road bed is made by levelling the sand and packing it with water. A layer of prepared brick is then laid flatwise, each brick being dipped in boiling tar as it is laid down. This is overlaid by a second course of prepared brick placed closed together edgewise, each brick dipped as before. The interstices are then filled with boiling tar, and the whole covered with a thin layer of screened gravel. The cost is about 36c. to 37c. (about 3½d.) per square foot.—*Society of Arts Journal.*

LOCAL GOVERNMENT BOARD INQUIRY AT TWICKENHAM.—Application having been made to the Local Government Board by the Twickenham Local Board for authority to borrow £25,000 for sewerage works within the district, an inquiry was held on Monday, Dec. 29, by Major Hector Tulloch, late R.E., the commissioner appointed to ascertain and report on the circumstances of the case. The area of land proposed to be taken by compulsory powers is 24a. 2r. 25p., belonging to Mr. Robert Pulsford, and situate on Whitton Common, within the parish of Twickenham, besides which the Board of Trade have secured about 5 acres on Twickenham Common, formerly belonging to Mr. E. H. Donnithorne, the chairman of the board. Mr. Pearson appeared to watch the inquiry on the part of the lessee of the land proposed to be taken, also to represent the inhabitants of Whitton, who opposed the pumping-station being placed on that land. Mr. Fladgate appeared to oppose the scheme on behalf of the owner of Marsh Farm, which adjoins the proposed pumping-station, urging that as Marsh Farm was a dairy farm, the carrying out of the scheme would render the farm unfit for dairy purposes. A deputation from the Ratepayers Protection Association, consisting of Messrs. Brown (hon. sec.), Humphreys, Webb, Taylor, Vincer, Reason, and Dr. Hewson, attended to oppose the works being carried out within the parish, and to support the petition signed by 270 ratepayers against the scheme, which had been duly forwarded to the Local Government Board. Mr. Lamburn attended to watch the inquiry for the Birkbeck Building Society; and Mr. George Baker on behalf of the lord of the manor. Mr. H. M. Ramsay, surveyor to the board, duly laid the plans and estimates adopted by the board before the commissioner, and Mr. Mansergh, the consulting engineer to the local board, assisted Mr. Ramsay in explaining the process of dealing with the sewage, which appeared to be simply to pump it on to the land, and mix sludge with town ashes, and purify by downward filtration, the effluent water thence passing through pipes direct to the river Thames. The estimate for the whole of the works was put down at £18,736; the cost of land was set at £4500. The balance was understood to be for compensation, &c. The sum of £3000 had already been borrowed on the rates, and £300 had been paid off. Mr. Humphreys opposed the scheme on the ground that Twickenham, one of the healthiest places in England, with a death-rate of only 13 or 14 per 1000, would be made an unhealthy village. He also objected on engineering grounds, and on the ground of expense, intimating that the total cost would far exceed the estimate. Another objection he had was in consequence of no alternative scheme being shown, when he knew of eight or ten other schemes. Mr. Brown urged that for about £5000 only a system of drainage could be carried out by localizing underground tanks, and allowing the sewage to pass through filtering-beds at the river side, which would answer the purpose for the present. It was a question if, under existing circumstances, £25,000 should be spent by way of experiment, when ultimately, in his opinion, a combination scheme would have to be carried out, probably from Strand-on-the-Green to Staines on the Middlesex side, and from Kew as far as Chertsey on the other, taking in the adjoining parishes. After hearing various objections from other persons, the commissioner proceeded to view the land proposed to be taken for the works. He disapproved of the land belonging to Mr. Pulsford, which he did not consider suitable for the purpose. He also thought that the local board ought not to have given notice to take land by compulsion until sanctioned by the Government Board; indeed, he considered that no land would be required for at least 18 months. He also objected to the smaller piece of land belonging to the board, owing to its close proximity to houses. He should be prepared to advise that the board have money sufficient to do all the drains in their district, because, whatever system was ultimately carried out, the place must be drained. He thought the farther they placed their pumping-station from the village the better, and considered that some charity land near Twickenham Cemetery would be far preferable. If they could not get any other land farther away, he was not prepared to say he should object to about half an acre of land on the north side of the river Crane being used for a pumping-station.

ECONOMY OF FUEL BY THE USE OF IMPROVED GAS APPARATUS FOR COOKING PURPOSES.

A paper with this title was read before the Inventors Institute, on Nov. 27, 1873, by Mr. E. R. Southby, from which we make a few extracts.

In boiling by gas, except in certain special cases, the greatest economy is secured by impinging a flame of considerable intensity, such as that from a Bunsen or other air burner, directly on the bottom of the vessel containing the water to be boiled, and when a supply of hot water or steam to cook substances placed in a separate vessel is required this plan may be safely adopted. There are, however, the following serious objections to all varieties of air burners:—First, offensive smelling and noxious products are usually formed when the flame is caused to impinge on comparatively cool surfaces, owing to its temperature being reduced too low for perfect combustion. Secondly, the flame in all these burners, as at present constructed, is more or less liable to "drop," as it is called. That is to say, the gas ignites not at the burner proper, as it ought to do, but within the tube of the burner at the point where the gas issues from the gas-pipe for mixture with air before reaching the burner. The consequence being that acroline, soot, and other offensive products, are formed in large quantities. This dropping always occurs in Bunsen burners when the flame is lowered below a certain point. Gauge burners are not so liable to it when the gauge is perfect and of the proper mesh, but they soon get out of order, when they are more objectionable than the Bunsen. This liability to dropping when the supply of gas is reduced, greatly diminishes the economy, for if the burner is large enough to bring the water rapidly to the boil, it cannot be reduced low enough to only just maintain that temperature without causing it to drop. The air burners have only the advantage in economy in heating the water to the boiling point, with the serious disadvantage of the offensive smell they produce.

But the large proportion of operations in the boiling department of cookery are on a very small scale; and where the cooking is only for six or seven persons, all the operations are small. In some of these, full ebullition is never required, and in most of the others, as soon as it is reached the heat must be reduced so as only just to maintain that temperature. For all these, the simple jet-burner, as arranged in Southby's apparatus, is at least as economical as any other, and is the only one that can produce perfect results, as it is the only one that keeps the whole bottom surface of the cooking-vessel at a uniform temperature, and at the same time a temperature that can be regulated without trouble, and with unfailing accuracy. With this burner there is no burning of the substances, in process of cooking, to the bottom of the vessel, and even in preserving, usually one of the most troublesome operations, requiring unremitting watchfulness, but little attention is required. The reason for this is evident. Instead of the heat being derived from absolute contact with flame, as in other burners, it is only heated air and radiated heat that reach the surface of the cooking-vessel.

To arrive at perfection in the second great operation of cookery—roasting—on the old system, is so difficult, that Soyer declared that none but born roasters could accomplish it. The gas-roaster has now made it one of the most simple, and certainly successful, processes that can be imagined. The economy of gas for roasting purposes over all other fuel is pre-eminent and indubitable, whether on the largest or the smallest scale. The economy, indeed, is so evident, that accurate experiments seem scarcely needed to prove it. Certain rules in the construction of the apparatus must, however, be strictly adhered to. In the apparatus now manufactured by the "Economic Gas Range and Roaster Company," a great improvement in gas-roasting has been effected. The roaster consists of a chimney, open at the top and bottom, in which the gas is burnt in a strong current of air. The burner used is composed of a No. 2 cannel fishtail jet tapped into a piece of iron tube. There is also a dripping-pan with a gridiron resting on it, on which to place the meat, and a cover that rests on the dripping-pan, leaving a space between the two for the escape of the vapours, and enclosing beneath it the upper portion of the chimney as well as the gridiron and whatever may be placed thereon. The result of this arrangement is that when the gas is lighted a powerful current of highly-heated air rushes through the chimney to the top of the cover, where, as there is no opening, it diffuses itself, and, descending as it cools, ultimately passes out between the edge of the cover and the dripping-pan.

In this apparatus the chimney forms a perfect brattice, and the laws of nature are allowed full play. The heated air can freely rush to the top, and as, in accomplishing its work, it loses its heat, and becomes saturated with the meat vapours it is so essential to get rid of, its constantly increasing density causes it to fall until it passes freely away at the bottom.

Objections have been raised against roasting meat in contact with the products of the combustion of gas. Three conclusive answers can be given to this objection. The first is that what we are content to take in large quantities diluted over our palates (and through our noses) into our lungs will surely not injure a roasting joint of meat by coming in contact with its surface. We use the same jets and the same gas for roasting that we light our rooms with, and the products must in both cases be the same. The second answer is that coal gas being derived from coal simply by distillation, can contain no elements that coal does not contain, and the products of combustion, as long as it is perfect, must be the same, with this exception, that as the sulphur which exists in coal has been almost entirely removed from the gas, there are mere traces of sulphurous acid produced, instead of the large quantities yielded by coal. The third answer is that gas, when perfectly burnt in air, produces only carbonic acid and water, the exact compounds you have in a bottle of soda water; yet who would think of objecting to the vapour of such a remarkably innocent body coming in contact with the roasting joint? I am, of course, always speaking of perfect combustion, and it is because the combustion in air burners is liable to be by no means perfect that I totally object to their use in gas-roasting. I believe to their use may be traced the greater portion of the prejudice existing in many people's minds against gas-cooking.

For baking pastry, gas-roasters are superior to any other form of oven, both in economy, ease of cooking, and perfection of results. With the roasters under consideration the temperature is raised to the exact point required in two or three minutes, and can be maintained at exactly the same point for any length of time. For ordinary family use, the gas-range, especially if combined with a good water-heating apparatus also worked by gas, is an enormous economy over the ordinary kitchen fire, whether in an open or close range. For at least eight months out of the twelve no kitchen fire need be lighted at all, and when a small fire becomes necessary for warmth, it can be utilized for boiling, and only the roasting portion of the gas-range kept in operation; or the range may be put on one side, and a gas-roaster substituted. In these days, too, when good domestic servants are becoming daily more difficult to find, the advantage of having an apparatus by means of which the most inexperienced can cook a dinner respectably, and that without annoyance from dirt or heat, is certainly very great. For these reasons, I have faith in the rapid extension of cooking by gas; and, effecting, as it does, a very great saving in the consumption of coal, I think I may say that its adoption to the greatest possible extent is a subject of national importance.

METERS TO PUBLIC LAMPS IN AUSTRALIA.—A colonial paper says the Kew Borough Council have adopted the plan of paying for the gas consumed by the street-lamps according to the quantity actually used, and have accordingly had a meter placed at the foot of each lamp-pillar. The boxes containing the meters are not very ornamental in appearance, but they make admirable seats, for which they are extensively used by the inhabitants.

COAL AND ITS PRODUCTS.

At the Conversazione of the Dundee Art Exhibition, on Tuesday, Dec. 23, Mr. B. M. MACRAE, the manager of the Dundee Corporation Gas-Works, delivered the following address on the subject of "Coal and its Products."

He said: It is impossible, in the short time allowed me, to give anything like a complete description of coal—its origin, its extent, and of its importance in producing and maintaining our national wealth and power. Suffice it to say that in the earlier epochs in the history of our globe, thousands of centuries before the appearance of man and of the other tribes of animals that now inhabit it, when the temperature of the solid crust of the earth was much higher than it now is, when from the then highly heated matter composing the interior of the globe—the heat being much nearer the surface then than now—there must of necessity have been enormous gaseous ejections from the interior, the most abundant of which would be carbonic acid. This gas is essential to the growth of plants. The abundance of it in an atmosphere largely impregnated with warm aqueous vapours was eminently favourable to the production of a vegetation so exuberant, of which there is now, so far as is known, no existing parallel. These large forests and other large collections of vegetable matter, being subjected to revolutions of the globe, were fossilized and became coal. It would be interesting and very instructive to reason out, or to read up the reasoning of others in showing, how coal so formed should be so varied in quality. By such an investigation you are introduced into a wide field of chemical combination, caused by volcanic action and the influences attendant thereon.

We have thus had a glimpse at the origin of coal. A word now of its composition. The varieties of coal are chiefly combinations of carbon and hydrogenous gases, the proportion varying in different qualities—the carbon entering into its composition in very large proportions, in all cases varying from 75 to 90 per cent.

It is proper here to say that the products of coal are so numerous that I will not even attempt to subject you to the infliction of hearing such hard names as many of them have got. There are products, however, in which all are interested, a few of which I will now mention. When coal is subjected to combustion it produces heat—an agent so important in all our industrial as well as our domestic arrangements. While its value in this respect can scarcely be over-estimated, it is well to bear in mind that there is some evil attendant on its use in our grates, unless used upon scientific principles. It has been proved over and over again that in the process of combustion 6 parts by weight of carbon combine with 16 of oxygen. It has also been demonstrated that in the combustion of hydrogen 1 part by weight of that gas combines with 8 of oxygen. It is thus found that in burning 10 lbs. of coal the oxygen contained in 1551 cubic feet of air is absorbed. It other words, to keep the atmosphere of a room in which a coal fire is burned fresh and pure, it is necessary to supply fresh air at the rate of 155 cubic feet for every pound of coal which is burned. It is of the greatest importance to the health of the occupants of a room that this law should be rigidly observed.

Another product to which I will refer is the next in importance to heat—namely, illuminating gas. We all know the immense importance of this product as an agent in obtaining light. Coal produces, according to the quality thereof and the manner in which it is treated, from 4000 to 14,000 cubic feet per ton—the gas varying in quality in proportion to the kind of coal used.

In the extraction of gas from coal an opening is made whereby all the other substances of which coal is composed are let loose, some of which are of great importance, and are eagerly pursued by the chemist, and utilized by him in many of our industries. No other branch of manufacture has brought into notice so many compounds not previously obtained from any other source, and above all offering at first sight so very little promise of utility.

Coke is a large residual of coal in the process of gas manufacture. In most coals 50 per cent. by weight remains in the form of coke. Tar also ranks largely as a product—tar, that no one will touch if he can avoid it, lest it leave its mark and cause trouble to get rid of; yet this very much despised substance in this form contains a great number of very interesting and important qualities—such as naphtha, benzole, from which nitrobenzole is obtained, a substance largely used in perfumery, &c.; and from benzole we obtain analine, from which many beautiful dies are obtained. Silks dyed by these colours we see displayed daily by their wearers, who are apparently quite satisfied therewith. Pitch, so useful in making floors in the form of asphalte, and in the manufacture of artificial fuel—holds a place of some importance in the products. When pitch is burned a dense smoke is evolved, which adheres to the walls of the chambers in the form of what is commonly called soot. This is lampblack. Naphthaline is another product, and, as far as is yet known, commercially valueless, is a virulent poison, and causes some annoyance by its presence.

Before leaving this series, I would refer to the heavy oil termed pitch oil. It has lately been discovered that it contains a substance which, when extracted and purified, makes a beautiful dye—a dye that can be used in dyeing cotton a beautiful Turkey red, quite durable, and is used as a substitute for the madder root in producing this colour. The name of this product is anthracene.

The last of this series of products is ammonia. This product, combined with sulphuric acid, produces sulphate of ammonia, and is of great value as a manure. Ammonia is also used in some of the arts and sciences, and in dyeing as an alkali, and in making smelling salts.

Another series of products, from its importance, requires to be noticed—the paraffin series. By a slight difference in the manipulation of the coal or other material from which gas is made, such as shale or other bituminous substances, a new series of products is found, or at least products in different combinations. Here we get gas as in the other process, but in much less quantity. The chief product is paraffin oil in its crude state. From this oil solid paraffin is taken, which, when purified, is used in making candles. The candles made from this substance come very nearly in appearance and quality to those made of pure sperm. After the paraffin has been separated from the crude oil we get burning oil, so largely used in lamps in the country and in villages where there are no gas-works. The light produced by this oil, when a suitable lamp is used, is very good indeed—so good that some enthusiasts have sometimes threatened to supersede gas by its use.

Another product is a cheap and, for many purposes, a good lubricating oil; another is what is termed spirit, the specific gravity of which is so light that it is apt to explode when near to any flame. This spirit is used as a substitute for turpentine in coarse outside painter work.

There is another product which I ought to notice, and it is the last for the present. I refer to carbolic acid. This product, although not in large quantities, is of great value. This acid constitutes a great part of the ordinary creosote, which is much used in the preservation of wood, such as railway sleepers; but it occupies occasionally a higher place than railway sleepers. Being very largely used as an antiseptic agent in medicine, it is found very valuable, especially for the treatment of putrid sores, and in admixture with sulphate of lime forms an excellent disinfectant.

I may, in concluding this short description of coal and its products, refer to the fears that have of late existed in many minds that our coal supply will soon be exhausted. At first sight, when we consider the enormous quantity of coal which is being consumed, there seems to be some cause for alarm. But we must look deeper then this. The coal-fields of Britain will serve our purposes for many centuries to come; and it is not too much to suppose that, by the progress of improvement and discovery, long before such a period of time shall have rolled away other and more powerful mechanical agents will be at the command of those who then occupy our places.

CAMBRIDGE GAS SUPPLY.—At the meeting of the Cambridge Town Council on the 1st inst., the Gas Test Committee presented a satisfactory report from Mr. W. E. Pain, setting forth the results of his examination of the gas supplied in the town, the average illuminating power of which he found to be 14·89 candles. The report was equally satisfactory as to the absence of sulphur and ammonia.

BAHIA GAS COMPANY.—We are happy to announce that the long-standing dispute between this company and the Provincial Government of Bahia has been brought to a close. It will be remembered that the matter in dispute related to the price to be paid for the public lamps. It has been hanging on for the last five years, and seemed at one time as though a settlement would never be arrived at. The Government at last accepted arbitration on the points at issue, and during the last month the award has been made. The whole of the claim presented by the agent of the company was conceded by the umpire, who also expressed an opinion in favour of the company upon a further claim for arrears of rental.

POISONOUS GAS IN A SCHOOL.—The teacher of the public school at Oakland, Penn., was one day astonished to see several of her pupils fall suddenly from their seats and lie, to all appearance, dead on the floor. Others dropped on their desks, and some arose from their seats and staggered towards the door of the room. The teacher then, for the first time, became aware of the presence of coal gas in the room, and felt its effects. She at once threw open the school-room door, and with the aid of such scholars as were yet able to move about, succeeded in getting all into the open air. Twenty-five of the pupils were taken out unconscious and laid on the ground, and others fell after getting out of doors. The teacher was also by this time seriously affected. Several of the scholars revived before the arrival of the physician, and all but one were restored to consciousness within an hour. The cause of the gas in the room was found to be a defect in the stove-pipes, which prevented the escape of the gas.—*American Paper.*

GAS-ENGINES.—Mr. Baker, one of the inspectors of factories, in his report for the half year ending April 30, 1873, says gas-engines appear to be slowly coming into use in various kinds of trades, particularly for small letter-press printers and ribbon weavers. It is a cheap and easily-applied power wherever a solid foundation can be obtained on which these engines can be placed, and they work smoothly and regularly, though rather noisily. In the neighbourhood of Coventry, the application of steam power forming a considerable elements of expense in the weaving of ribbons, the gas-engine has been applied to do the work of turning-boys of 13 or 14 years of age, who formerly used to turn the machinery, as also used to be the case in the poplin manufacture of Dublin. For such, or for any trade where gas can be readily obtained, and where not more than about one-horse power is needed, the gas-engine seems to be a valuable invention, and one is glad to recognize it as another means of relieving labour of some part of its fatigue.

ENTERTAINMENT TO GAS WORKMEN AT DUNDEE.—Last Tuesday evening the *employés* of the Dundee Gas Commissioners held their annual festival in the Union Hall, which was gracefully decorated for the occasion with flags and wreaths of evergreens. Mr. B. M. M'Crae, manager of the works, occupied the chair, supported by Mr. Matthew, treasurer, and Mr. Moir, convener of works. After an excellent tea, purveyed by Mr. J. G. Smith, Nethergate, the chairman read letters from Mr. Duncan, convener of finance, and Mr. Thornton, clerk to the commissioners, expressing their regret at being unable to be present on the occasion. He then said: "I am extremely glad to see so many of the *employés* of the Gas Commission present—so many with their wives with them, and so many accompanied by those whom they intend to make their wives. There is a new feature in the arrangements this year, that is, that you have your sons and daughters with you. That is a decided improvement which the committee have made. I do not know a better sign of a good man or a good wife than when they take a deep interest in their children, and I trust that is an indication that we are improving in our calibre. I do not know of any special subject on which I might address you, as each one has his own views of things in general; but we are met here as *employés* of the Dundee Gas Commission. The past year has been one in which there has been more work done in every department than in any previous year; and, speaking generally, it has been done with more cheerfulness and earnestness, and I hope that for next year I may be able to make the same statements. We have enjoyed the privilege of serving the commissioners as pleasantly as in any former year, and that has been very pleasing, and is, I trust, what we may always be able to say. It is of all the good things I am to speak to-night; we can deal with the bad things when they come. We owe a debt of gratitude to our customers in Dundee, of whom we have rather more than any shopkeeper. While our customers require to be pleased with the article they get, that it is properly measured, and no more exacted than what is right, we are indebted for their forbearance with us. And whilst the *employés* are inferior to none, still there are some little slips, some little neglects—'the best of men are men at best'—and while the public have been very forbearing, which is a good thing, I trust every one of us will make an effort to give still greater satisfaction. Another good thing, there is scarcely an individual in the employment but what is earning more wages than what he did in any former years. We all trust it may continue. We have enjoyed these things, not by any physical force, not at the point of the bayonet, not a threat, strike, or any coercion to gain these comforts for the past year. I hate strikes as injurious alike to employers and employed. They are bad from beginning to end. Sometimes they are caused by the over-exactions of the employers; sometimes by the wrong demands of the men; but on whatever side the wrong lies, sooner or later the wrong-doer will be brought to suffer. But generally speaking these things have been done in the most upright and pleasing manner. Another good thing I rejoice to see is so many of the wives present. I cannot understand how a man can be a good workman who has not a good wife, or otherwise looking forward to have a wife and a fireside of his own. I trust you will all thoroughly enjoy yourselves to-night, and hope we may be spared to meet again next year. Out of a desire for your good I have to make the request that as this is a season when so many snares are spread out before you, you will seek to pass through it as pleasantly, innocently, and profitably as we have done here to-night." Mr. Moir said he felt much pleasure in being present and seeing so many faces—young and old—all enjoying themselves. He was sorry that none of his fellow-commissioners had been able to attend. It had always fallen to him to have the pleasure of being present, and, if spared, he hoped to meet them again. The meeting, he considered, was an excellent one, and did them credit. A varied programme, consisting of readings, vocal and instrumental music, was satisfactorily gone through. Miss M'Crae presided at the pianoforte with her usual taste. Votes of thanks were awarded; and a most enjoyable evening was brought to a close by the company singing, "Auld Lang Syne."

NOTTINGHAM WATER SUPPLY.—At the meeting of the Corporation of Nottingham, on the 31st ult., the town-clerk presented a report on the bill which the water-works company are about to apply to Parliament for in the coming session. After stating the specific objects of the bill, the report proceeds:

The present capital of the company is £250,000, and their borrowing powers are £40,000. If the proposed bill should become law, the total capital of the company will be £350,000, and the borrowing powers will be £85,000. The proposals in this bill are somewhat similar to those contained in the bill of last session. That bill was rejected by the Commons under circumstances which have been detailed by the Town Council. The present maximum dividend paid by the company is 5 per cent. The shares of the company are now at a premium of from 24 to 26 per cent., and the difference between the nominal value of the shares and its actual value becomes capital not bearing interest. The present bill enables the directors to distribute the proposed new capital among their shareholders. If, therefore, Parliament should allow the water company to raise the sum of £100,000 in the manner proposed by the company the public would lose the premium on the new capital, amounting to a sum that may be estimated at £25,000. This amount would be distributed in effect among the present shareholders. Again, the additional interest on £100,000, at 2 per cent., would represent £2000 per annum. This sum capitalized at 4 per cent. will give a sum of £50,000. It will be seen that the directors of the water company are proposing to take from the inhabitants of this town and district the sum of £75,000, without affording any corresponding advantage. There seems very little probability of the company obtaining leave from Parliament to raise new capital at an increased dividend, and there is still less likelihood of the company acquiring power to distribute any new capital among their present proprietary. The further question will arise whether, in view of the extremely liberal terms which the corporation has offered the directors for the purchase of the undertaking, Parliament will permit the company to raise any more capital. The Town Council will have to consider the desirability of opposing the present bill, and to direct what steps shall be taken for that purpose.

The council resolved that it was expedient, in the interest of the ratepayers, to oppose the bill, and a committee was appointed to take action in the matter.

BIRMINGHAM WATER SUPPLY.—Dr. Hill, the medical officer of health for Birmingham, reports that the water supply of that town in December was "pretty clear," and showed a general improvement.

HULL WATER SUPPLY.—At the meeting of the Water-Works Committee, on the 29th ult., Mr. Dale, the engineer, reported that the quantity of water sent into the town during the previous fortnight was 67,694,453 gallons, being an average daily supply of 4,835,318 gallons.

BRADFORD (CORPORATION) WATER-WORKS.—The year book of the Bradford Corporation gives a concise and lucid description of the water-works for the supply of the borough. These works are entirely on the gravitation principle, and the district of supply includes 34 of the surrounding towns and places, with an aggregate population of not less than 280,000. The levels of the district vary from 200 feet above the level of the sea at Apperley Bridge to 1200 at Queensbury, making a difference of 1000 feet of elevation to be covered. The supply is given in two separate services, called the high and low level, the high level being again divided and served by separate mains. The low level includes all places at a lower level than 500 feet, and the high level all places above that height. The pressure of water in some of the distributing mains rises to upwards of 200 lbs. on the square inch. The lowest level of the gathering-ground from which water is taken for supply is 1030 feet above sea level, and the moorlands from which water is taken for compensation and supply range in elevation from 600 feet to 1475 feet above the level of the sea. The drainage areas comprise a total of 13,000 acres. The length of conduit and pipe from Heaton, near Bradford, to Sandbeck Beck—the most distant stream to the north, is 22 miles; and there are about 13 miles of mains from Bradford to Bond Clough, Haworth, the most distant point to the west. There are eight reservoirs for the town supply, and one in course of making, and four compensation reservoirs, two others being in progress. These works have, so far, cost over one million pounds.

SOUTHWARK AND VAUXHALL WATER COMPANY.—The report of the directors presented at the half-yearly general meeting of proprietors on the 11th ult. was as follows:—"The directors beg herewith to submit to the proprietors the half-yearly accounts of the company to Michaelmas, 1873, which have been duly certified by the public auditor appointed by the Local Government Board, and by the auditors of the company.

The authorized capital of the company is	£2,000,000 0 0
The capital paid up is	1,605,325 12 0
The shares issued but not yet called up amount to	118 015 0 0
The shares and mortgages remaining to be issued amount to	276,789 8 0
The expenditure on works has been	1,604,094 19 10

The laying of the large mains for dividing the high and low level districts is rapidly progressing, and the covered reservoirs, engine and boiler houses, at Peckham, are far advanced towards completion. At the Hampton works additions have been made to the boiler-houses, and four new boilers placed therein. The state and condition of the company's works continues to be in all respects satisfactory. The directors regret to announce the death of James Clay, Esq., the late chairman of the company, and in virtue of the powers conferred by the company's Acts they have appointed Frederick Kett Barclay, Esq., to be a member of the board for the time yet unexpired of the period for which Mr. Clay was elected. Agreeably to the provision of your Act, three of the directors go out of office by rotation — viz., H. Whiting, Esq., C. M. Vialls, Esq., and G. Tyrrell, Esq.—but are eligible for re-election, and offer themselves accordingly; also one of your auditors, J. Young, Esq., of the firm of Turquand, Youngs, and Co., who is eligible for re-election, and offers himself accordingly. The increase in the company's rental for the year ending Michaelmas last was £11,033 10s. 6d., but the rise in the price of coal and wages has temporarily pressed with great severity on the profits of the company. The directors recommend that a half year's dividend at the rate of 5 per cent. per annum on the ordinary stock and class D shares, and on the preference stock and shares; 4½ per cent. per annum for the quarter ending June 30, 1873, and 5 per cent. per annum for the quarter ending Sept. 30, 1873, on class G shares; and at the rate of 4½ per cent. per annum on the new ordinary shares, be declared payable on the 15th of January, 1874."

BERLIN WATER-WORKS COMPANY, LIMITED.—The directors of this company have issued a notice to their shareholders, in which they state that the contract for the sale of the works and property of the company for the sum of £1,250,000 was signed at Berlin on the 31st ult. It was a condition of the contract that the municipality should obtain a discharge from the Crown of all the obligations of the concession binding on the company, and it is understood that this has been arranged with the authorities, but the formalities in evidence of it, including the signature of the Emperor, will take some little time to carry out. In the meantime the municipality has paid to the company the sum of £1,200,000 on account of the purchase-money, which sum was received in London on the 2nd inst., and deposited at interest with the London Joint-Stock Bank, on an arrangement with the municipality that the amount should be returned if by any unexpected circumstance the Crown's discharge should not be obtained—a contingency most improbable, but against which it was necessary to provide. Mr. Sim, the chairman, has been for some days in Berlin for the purpose of completing the contract, and he is still there with the object of expediting, if possible, the formalities relating to the Crown's discharge, which he hopes to obtain in about a fortnight. In the meantime he will settle the accounts of the half year's working with the municipality, so as to admit of the balance of the purchase-money being paid over to the company, and the whole transaction carried out. It is added that due notice will be given to the shareholders of the completion of these arrangements, and steps taken at the earliest moment for dividing the money, and winding up the affairs of the company.

NAPLES WATER SUPPLY.—*The Times* correspondent writes, under date of Dec. 13:—"Some days have elapsed since I reported that the project for supplying Naples with water warned danger, as the caution-money had not been deposited on the day appointed. There is now, I am happy to say, a fair prospect of the difficulties being surmounted, and by the time that the summer heat comes down upon us, or cholera looks in to see how its lessons have been attended to, we shall be in a better position to meet them. The concession of the works, it appears, was made to Messrs. Roberts and Manby, of London, who ceded it to the General Credit Bank. According to the stipulations entered into, the caution-money was to have been paid down on Nov. 30 last, and, failing to do so, the concessionaires legally lost their

rights. The representatives of the bank, however, arrived a few days since, and, on presenting themselves to the Syndic, demanded a modification of the contract and a restitution of the rights they had forfeited by not arriving in time. The Syndic can, of course, take no decided steps in the matter, nor can the Giunta, which has held several meetings this week, but some conditional arrangement has been entered into, subject to a vote of the council, which will be called together expressly to decide this important question. The temporary arrangement is this:—'That the Syndic shall be authorized to accept 90,000 lire of rents as the complement of the definitive caution-money, as a deposit, without prejudice to the rights of the municipality, and with the reserve also that the modifications demanded by the concessionaires shall be referred to the Giunta, and finally to the council.' This arrangement has been accepted by the representatives of the bank, and the deposit of the sum named above has been made in the Bank of Naples. There is still an opportunity for upsetting everything that has been done if interested or litigious persons are so resolved; but the Giunta is, I believe, honestly desirous of completing what is desired by the entire population of Naples. 'The General Credit Bank,' says a local journal, 'on assuming the concession, declared that it would not recognize all the engagements entered into by the original concessionaires, amounting to about five millions of lire,' and yet, unless they do so, the affair is considered here as possible, but not good. It is evident that each side must yield a little, and, unless this is done, Naples will remain in its hopelessly dirty and unhealthy state."

Prizes for New Inventions.—The Paris Society for the Encouragement of National Industry have offered a prize of 2000 francs for the most practical and economic mode of producing oxygen, and a prize of 3000 francs for the disinfection of the residue of the purification of gas.

Enormous Pumping Machinery.—Messrs. John and Henry Gwynne, of the Hammersmith Iron-Works, Hammersmith, are constructing a remarkable set of centrifugal pumping machinery, intended for employment on the reclamation of the Ferrara Marshes, in Northern Italy. The tract to be reclaimed extends over an area of nearly 200 square miles, and the work to be done by the pumps consists in raising a little over 2000 tons of water per minute. The first pair of these pumps, with their engines, have just been completed. It is difficult to realize what is meant in saying that certain pumps have to raise 2000 tons of water per minute; 2000 tons, or 456,000 gallons, per minute, equal 656,640,000 gallons per day of twenty-four hours. According to the latest return, the total quantity of water supplied by the whole of the London water-works is a little under 110 million gallons per diem, so that it will be seen that the quantity of water to be dealt with by the Ferrara pumping machinery amounts to six times the whole metropolitan water supply. Again, 456,000 gallons, or 72,960 cubic feet, per minute, would supply a stream over 103 feet wide, and 4 feet deep, running at a speed of two miles per hour, or 176 feet per minute; while the delivery for a single day would suffice to fill a reservoir a mile square, to a depth of about 3 feet 9 inches.—*Builder.*

Reform of Local Taxation.—The new Solicitor-General (Sir William Vernon Harcourt) speaking last week at the Druids dinner, remarked: "It is quite true that we grievously need a reform of local taxation. The state of the rates is the scandal of our day and generation. Our imperial finance has reached almost its perfection. Our local finance can hardly arrive at a point where it could be worse. While our general taxation has rapidly diminished, our local taxation has more rapidly increased. While crime is greatly lessened, and pauperism, I am happy to say, is largely on the decline, the rates were never more oppressive. Why is this? I will tell you. The ratepayer is the helpless victim of the crotchet-mongers. Rate after rate is imposed in the vain attempt to fill the insatiable maw of centralized philanthropy and *doctrinaire* extravagance. The rate is nothing else than the quarterly bill sent in by grandmotherly government. The country is infested by a voracious caterpillar—I don't know what the entomologists call it—I would call it the *Inspector Vastator*. I think I once said to you that the day might come when the number of the inspectors would exceed the number of the inspected; it is fast approaching. Till you stay this plague of crotchets, till you have the courage and good sense to resist the importunate benevolence of these reckless spendthrifts, all your attempts to reform local taxation will be in vain."

Supply of Petroleum.—The *Titusville* (Pennsylvania) *Herald* reports that the old oil wells are falling off rapidly, but new wells coming in appear to keep up the production. No new wells are started from the top of the ground, but no one can see the end of the fourth sand development. The *Herald* says: "With present low prices the question of employing petroleum as fuel is again agitated. The latest intelligence upon the subject comes from Canada, where a man named Relighine has been trying an experiment on a locomotive belonging to the Canada Southern Railway, with an average consumption of four gallons per mile. The engine steamed quite freely, and made good time with a train of 30 cars. This would be about a barrel for every ten miles. The most simple contrivance for burning petroleum is either by means of a jet of steam or compressed air passed at right angles over the orifice of a pipe in such a manner that the oil will be sucked up and thrown into the furnace in the form of a fine spray, where, if properly adjusted, it will undergo perfect combustion. The cost of the apparatus is trifling. The whole point, it seems to us, turns upon cheapness, and as the market might go up rapidly with any marked increase of demand, there seems to be an indisposition to try the experiment. There can be little doubt that oil will be found in many parts of the country where at present it is not thought of, in which case a new and unlimited market for its utilization as fuel would naturally follow." A Californian paper states that oil has been found on the bank of the Pajaro River.

Colladon's Gas Purifier and Mixer.—M. D. Colladon says: "Gas requires to be freed from particles of solid matter, naphthaline, coal tar, ammoniacal salts, &c., as well as from gases such as carbonic and sulphurous acids. For washing it, vessels have been employed similar to Woolf's bottle, in which the gas traverses water or a suitable solution through a metallic network, in the form of bubbles or continuous currents. This arrangement is insufficient for working on a large scale, because the bubbles of gas take a spherical form, and consequently present a minimum of surface for a maximum volume. Further, this method requires a decided increase of pressure, which is inconvenient. The chemical cascades, in which the gas passes upwards through a fine rain of the washing liquid, act much better, but they require too large a quantity of liquid. Coke towers (scrubbers) produce a more complete effect, but the action is very irregular. The new mechanical washing apparatus has the advantage of producing very powerful action without requiring large dimensions. At Geneva it yields coal gas, superior both in illuminating power and in a sanitary point of view. Less purifying matter is also required than on the old system. The same apparatus will doubtless prove useful when it is required to saturate a gas with the vapours of a liquid—for example, hydrogen with the vapour of petroleum. The system rests on the principle that the best arrangement either for washing a gas or saturating it consists in making it strike, in the form of currents as thin as possible, against solid walls kept perpetually moist. The currents are broken against these surfaces, and are prevented from moving on in a straight line. The gaseous particles are thus always kept in a rotary movement, and are pressed against the moist walls, so that they either absorb the substance diffused over these walls or may deposit there a part of their own substances, according as it is required to saturate the gas or to wash it."—*Comptes Rendus.*

A New Fuel.—A new fuel, says the *Scientific American*, has recently made its appearance in our market, which, on account of its intrinsic value, as well as its novelty, is deserving of notice. Although a natural production, it can hardly be called a coal; and, although possessing to some extent the properties of coke, it is not produced by any of the methods common to the manufacture of coke. The proprietors have given it the appropriate name of "carbonite." It is found, to a limited extent, in the bituminous coal-fields of Central Virginia, constituting a distinct vein by itself, which is now fairly developed and yielding a steady supply. It is sold in lumps like cannel coal. The surface, when broken, is dull in appearance instead of glossy, as is the case with cannel or anthracite coal. It burns with a bright flame when first ignited, and almost without smoke, and subsequently settles down into a bed of bright coals not unlike anthracite in appearance, but lacking the intensity of heat produced by anthracite, and at the same time more enduring. It seems to be especially suitable for open grates, and more particularly for parlour use, on account of its freedom from smoke or bituminous smell, and also from the small proportion of ashes (only 2¼ per cent.) resulting from combustion. The ashes are also of such density that, in the process of stirring or removing, they do not rise into the room. The analysis recently made by Dr. Wallace, of Glasgow, and given below, shows a larger proportion of combustible matter than is found in any known fuel, being 96 per cent. that is available for producing heat. It has but a slight trace of sulphur, and is therefore free from the pungent odour and gas incident to anthracite coal. It is superior to any other fuel in the power of producing steam, and may prove especially desirable for steamships making long voyages, on account of its economy of space.

Analysis.

Volatile combustible matter	14·26
Fixed carbon	81·61
Sulphur	·33
Ash	2·24
Water at 212° Fehr.	1·56
	100·00

This unique product of the earth is accounted for as follows:—Originally a vein of bituminous coal, but lying upon and covered with a fine clay, it appears to have been subjected to heat by an overflow of trap rock on the surface, thereby expelling the gaseous and volatile properties of the coal. A process of nature has thus accomplished, on a grand scale, a more perfect result than is attainable by artificial means, and has delivered for human use a deposit of natural coke, so condensed, by the process under which it was formed, as to acquire a specific gravity nearly the same as bituminous coal, and possessing a heating power fully equal to our best anthracite.

Cremation.—In an article devoted to this subject, *Iron* informs us that at the Milan Gas-Works Dr. Polli made a notable experiment. In a cylindrical retort of refracting clay, used for the distillation of coal-gas, was placed the body of an unfortunate poodle dog, drowned for contravention of the muzzle laws promulgated by the police. The dog weighed 22½lbs. The apparatus was heated by a crown of flames issuing from a perforated circular tube. In order to render combustion as active as possible, the coal gas was mixed with a certain quantity of pure air. Our readers will recollect that this addition of atmospheric air is the principle of the Bunsen burner, which ensures perfect combustion of coal gas, and produces a maximum of heat with a minimum of light. The cremation lasted several hours, producing a thick smoke, with an odour of roast meat. After carbonization, the skiful chemist succeeded in obtaining complete incineration, that is to say, the calcination of all the solid parts of the body, which weighed 1lb. 14½oz. Satisfied with the result of this experiment, which proved the possibility of reducing the carcase of an animal to ashes by ordinary coal gas, Dr. Polli proceeded with a second and more complete experiment. One improvement was the disposition of a vertical retort in such manner as to consume the gaseous products of combustion. This is easily effected by placing at the upper orifice of the retort a second ring of gas jets. On this occasion better arrangements were made for carrying out the principle of the Bunsen burner, with the result of producing the complete incineration of a dog weighing 42¾ lbs. in the space of a couple of hours. On this occasion the solid residue weighed only 2lbs. 3ozs. Dr. Caffe mentions the idea of an engineer, M. Rudler, who suggests the utilization of the gaseous products. Burnt in a retort by coal gas, the body consumed may be made itself to yield illuminating gas—a process which possesses at least the merit of economy.

Parochial Civil Wars.—Under this heading a correspondent of *The Times*, residing in the Seven Sisters Road, Finsbury Park, writes:—"The dwellers in this neighbourhood are experiencing in a remarkable manner the benefits of local rule. Owing to a quarrel between the local boards, we have had the gas cut off from the public lamps since March last, and a populous neighbourhood and great thoroughfare have now for nine months been plunged in utter darkness from sunset to sunrise. During the summer we were suffocated with dust, for, owing to the same cause, not one drop of water was bestowed on the road. Notwithstanding, we are regularly waited upon for, and compelled to pay for 'lighting' and 'watering.' I am informed that we have no appeal, and that we are entirely at the mercy of the vestries." In reply to this communication, the vestry-clerk of Islington (Mr. John Leyton) writes, "That the complaint as to that part of the road lying between Holloway Road and the entrance to the Finsbury Park, Stroud Green Road (quite three-parts of the road referred to), is wholly incorrect; there has been no quarrel with local authorities; the lamps have never been extinguished or the gas supply cut off; and the road and footpaths have been well made, paved, maintained, and watered. In fact, there is not a better roadway in the metropolis than this large proportion of the Seven Sisters Road to which I refer, and which is under the jurisdiction of the vestry of Islington. The other part of the road, &c., outside Islington parish, is, I believe, in a bad state; and I never could understand why Hornsey parish has not been included in the metropolis, and placed under the jurisdiction of the Metropolis Local Management Act; whilst Charlton and Woolwich, on the south side of the Thames, have been included in the metropolis. There is a bill, promoted by the Board of Works, about to come before Parliament, and perhaps Hornsey could be inserted therein." A rejoinder has been made by Mr. Bennett, clerk to the South Hornsey Board, in which he states that the lamps in question are not in his district, but in North Hornsey:—"This question was decided after an inquiry held on the 13th and 14th of January last year, by direction of the Local Government Board, and, as consequent upon that decision, the individual members of the South Hornsey Board who happened to sign the cheques for payment of the charge of lighting these lamps—for they used to be lighted by South Hornsey—stand surcharged by the official auditor with the amount paid on that account as an illegal expenditure—a very good reason why the South Hornsey Board discontinued lighting those lamps."

Institution of Civil Engineers.—In the annual report of this institution, presented at the meeting on the 23rd ult.—the president, Mr. Hawksley, in the chair—the council stated that their attention had been devoted to a question of the gravest importance—viz., how the character, scope, and style of the original communications (papers) read at the meetings, and the consequent discussions, could be improved? Having regard to the number now presented, and to the impossibility, for want of time, of reading and discussing thoroughly more than ten or fifteen communications in each session, it was proposed, as far as possible, to accept for reading at the meetings only papers which contained principles suitable for discussion, reserving such others as might be accepted for publication in an appendix to the proceedings, either *in extenso* or in abstract. This would introduce what might be regarded as another class of original

matter into the volumes; but the council deemed other alterations necessary to meet the exigencies of the case. It had, therefore, been determined to introduce a system which had been found to act beneficially in other societies, both at home and abroad. This was the organization of a scheme by which the publications of the institution should contain a summary of information, gathered from the transactions of foreign engineering societies and from foreign scientific periodicals, on all branches of professional knowledge. The "minutes of proceedings" might then be regarded as complete works of reference, which, in the interests of the institution, it was desirable they should be, affording, in fact, a perfect record, however brief, from year to year, of the progress of engineering science. The council were of opinion that the surplus funds might thus be most advantageously employed in furtherance of the objects for the advancement of which the institution was incorporated. The ballot for the council for the ensuing year resulted in the election of Thomas Elliot Harrison as president; William Henry Barlow, John Frederick Bateman, George Willoughby Hemans, and George Robert Stephenson, as vice-presidents; James Abernethy, Sir William George Armstrong, C.B., Joseph William Bazalgette, C.B., George Berkley, Frederick Joseph Bramwell, George Barclay Bruce, James Brunlees, Sir John Coode, William Pole, Charles William Siemens, Sir Joseph Whitworth, Bart., and Edward Woods, as members; and Major Frank Bolton, James Staats Forbes, and William Newmarch, as associates.

Register of New Patents.

762.—FLEURY, F. G., Merrick Street, Southwark, "*Improvements in water-meters, or apparatus for measuring the flow of liquids.*" Provisional protection only obtained. Dated March 1, 1873.

This invention relates in the first place to the construction of inferential meters with a circular casing, having tangential outlet openings arranged in such manner as to produce an induced vortex motion of the liquid, and thereby to ensure a more reliable action on the surfaces for actuating the spindle and recording mechanism. Another part of this invention consists in making the circular chamber with a single central opening in its lower part or bottom fitted with a vertical tube or casing, having an enlarged closed circular top formed with tangential openings in its circumference, opposite to which are arranged the vanes or surfaces against which the body of liquid in the upper part of the circular chamber is caused to operate for actuating the recording mechanism. In some cases the meter may be arranged for a reverse direction of the fluid.

768.—PARLBY, W., Aylesbury, Gas Engineer, "*Improvements in the construction and manipulation of apparatus used in the manufacture of gas.*" Patent dated March 5, 1873.

This invention has for its object the construction of improved apparatus known as mouthpieces, lids, and fastenings used in the manufacture of gas, and improved modes of manipulating the same, and consists in constructing the cross-bar and its juncture with the mouthpiece of the retort, so as to form a hinge or joint without the aid of eccentrics; and provision is made whereby the lids may be shifted or swung into any required position during the charging and discharging of the retorts, and when closed will produce an effectual and sound joint.

The manner by which the lid is rendered moveable is as follows:—The cross-bar (which is hinged upon the mouthpiece of the retort) is fitted with a central hole, within which a screw is made to work. The outer end of this screw is provided with a T-shaped or other suitable handle for turning the same, and the other end is made to fit within a socket upon the lid. This socket is bored out upon a raised centre in the lid, and the end of the screw turned so as to form a perfectly true joint when placed in the socket. This screw, when brought into action, is prevented from being drawn out of the socket by means of a pin passing through the socket near its circumference, and the screw moving in this socket is made with a small groove for receiving the pin, which acts so as to retain it in the socket.

798.—TIFFANY, J. C., Portsmouth, U.S.A., "*Improvements in means or apparatus for manufacturing and storing illuminating gas.*" Patent dated March 5, 1873.

This invention relates, firstly, to improvements in the arrangement and construction of furnaces and retorts for manufacturing illuminating gas from oils, hydrocarbons, and other similar substances, whereby the heat of the furnaces shall be most economically employed, and the gases evolved may be subjected more thoroughly to the action of the heat of the retorts, more thoroughly purified, and at the same time economy effected in the wear and tear of the retorts. Secondly, the invention relates to improvements in gasometers or gasholders for the storeage of illuminating gas.

In carrying out the first part of the invention a furnace is so arranged as to contain in its interior a fire chamber constructed of fire-brick, between which and the walls or shell of the furnace a non-conducting material is placed, also a peculiar arrangement of heated air chamber and means of supporting the retort.

The object of the second part of the invention is to produce a gasometer or gasholder composed essentially of a stationary bottom plate and a moveable head or crown, to which are attached flexible curtains of india-rubber cloth or other fabric rendered impervious to gas and air, and consists in attaching the fabric constituting the curtain or body of the gasometer to the bottom plate and moveable crown or head by means of annular bands, links, or rods, which compress or clamp the fabric between the edges of the plates and said bands for forming an air and gas tight joint.

The invention also consists in applying to the flexible curtains or body of the gasometer a series of loops or eyes travelling on stationary guide-rods on the receiving frame for maintaining a true shape of the gasometer when expanded by the gas, and for preventing uniform crimping of the same when in a collapsed state.

The invention also consists in making the bottom of the gasometer with a concave or corrugated upper surface, forming a receptacle for collecting tar or any condensable matter that may pass the purifiers or condensers.

The invention also consists in applying to said concave bottom a series of rods or a wire gauze or perforated diaphragms for preventing the curtain or body of the gasometer, when in a collapsed state, from coming in contact with the condensed matter collected in the concave bottom.

The invention also consists in the employment of one or more syphon tubes applied to a concave or corrugated bottom for the escape of the condensed material, and for preventing the entrance of the external atmosphere into the gasometer.

The invention also consists in constructing the moveable crown or head of the gasometer partially of a skeleton frame or metallic rims, and a flexible covering attached by the same clamping bands or fastening devices, which secure the flexible body or curtain in position.

The invention also consists in attaching to the interior or exterior of the curtain or body of the gasometer a series of strengthening hoops for preventing an inward or outward collapsing of the curtain so as to retain the form of the gasometer.

807.—WISE, W. L., Chandos Chambers, Adelphi, "*An improved air gas apparatus with injector for the self-regulating production of gas from volatile fluids.*" A communication. Patent dated March 5, 1873.

The inventor prefaces the description of his improvements by stating that he is well acquainted with the fact that other gas for illuminating purposes was produced as far back as the year 1780. The atmospheric air was impregnated with volatile carburetted hydrogen oils (naphtha). Since then innumerable apparatus have been constructed for other or naphtha gas. Now if other gas apparatus is to be adopted for general use, it should fulfil the following conditions:—1. The danger of ignition and explosion must be done away with, to which end he entirely separates the liquid reservoir from the generator, and separates both of these from the bellows, air-pump, ventilator, or other air-forcer. 2. Gas must only be produced at the moment it is wanted, and to the extent required, and volatile oils or residues must on no account be suffered in the generator whilst the apparatus is not working, as they may on a rise of temperature provoke an explosion, owing to a rapid production of gas, without any corresponding consumption thereof. For this reason he employs the injector, which draws fluid from the lowest part of the still lower reservoir, and injects the same to the generator only when gas is being consumed, that is, whilst air is being blown into the generator by the bellows, air-pump, ventilator, or other air forcer. The current of air introduced from the air forcer to the generator corresponds exactly to the quantity of gas which is consumed out of the generator through the gas conduit, and in like manner the quantity of oil taken out of the reservoir by suction depends entirely and precisely upon the current of air flowing from the air forcer through the injector into the generator. 3. It is further imperative that the apparatus should admit of all the raw material being used and consumed at all times, and of uniform good quality, without leaving residue, and without the use of heating arrangements, to which end he draws from the reservoir the quantity of fluid corresponding to the consumption of gas, and proportioned to the volume of passing air for the time being, and blows them well mixed, in the shape of the finest dust or spray, into the generator. 4. Finally, it is considered necessary that the apparatus should not require repeated filling and restarting. He therefore supplies it with a fluid reservoir (which must be proof against ignition), equal in capacity to the maximum producing capabilities of the apparatus, and provides this reservoir with a proper fluid-meter or gauge. Even the very smallest apparatus he constructs so that it may be capable of operating at least an entire day without refilling, taking into account its maximum power of production. This portable gas apparatus, which is comparatively of very diminutive size even for the production of gas on a large scale, is based upon the four main conditions above specified, said apparatus being supplied, as may be requisite, with bellows for private houses and railway carriages, with ventilators for illuminating larger buildings, factories, railway stations, &c., and with air-pumps for towns and cities.

823.—WRIGHT, W., Sheffield, plumber, "*Improvements in the manufacture of gas for heating and illuminating purposes, and in apparatus for the same, parts of which are applicable to other purposes.*" Patent dated March 7, 1873.

This invention consists, in the first place, in preparing the spirit with which atmospheric air is to be impregnated, in order to produce the required gas, by distilling petroleum or benzoline with vegetable charcoal until the spirit is sufficiently purified.

The invention consists, in the second place, in the apparatus and process in and by means of which the said atmospheric air is impregnated with this prepared spirit.

The apparatus in which the air is thus impregnated consists of a series of two or more cylinders or air-tight chests, with communicating pipes from one to the other so as to admit of air being forced through the series. Each cylinder or air-tight chest is filled to near the top with a series of stationary pistons, formed of cotton or other similar fibrous material admitting of air being forced through them. The cylinder or air-tight chest has also at the bottom a reservoir for containing the prepared spirit with which the said pistons become charged by reversing the several cylinders, which for this purpose are mounted on two swivel joints, which also act as two taps for closing simultaneously all communication with both the air-pipe or inlet, and the gas-pipe or outlet. The said reservoir is separated from the pistons by a perforated plate through which the air has to pass. At the bottom of each reservoir is inserted a tap which communicates with a pipe and tap belonging to the next cylinder, so as to equalize the supply of spirit in each reservoir. The air under pressure enters at one of the swivel joints through a valve, and passes into the first cylinder under the perforated plate, and thence upwards through the series of cotton pistons and out of the said cylinder at the upper part thereof, whence it passes by a communicating pipe into the bottom part of the next cylinder, and through the series of cotton pistons therein, and so on until it reaches the swivel joint on which the last cylinder is mounted, and passes therefrom in the form of gas to the burner, or wherever it is required to be consumed.

The apparatus for forcing the air into the said cylinders consists of two aërometers worked in the usual way, but coupled together by a cord or chain passed over pulleys so as to admit of the one rising as the other falls. By applying a weight to the air holder already drawn up, the air contained therein is forced down a pipe, thereby opening a valve through which it passes into the cylinders, at the same time closing a valve fitted at the top of the said air holder. Also at the same time the valve at the top of the second air holder (which is about to rise) is opened, and admits air into the holder, and the valve at the bottom thereof is closed against the entrance of the air from the first or descending holder. By means of the two aërometers thus coupled, by merely changing the weight from one to the other, a constant supply of air from the descending holder is forced through the cylinders as required.

The air may be forced into the cylinders by other means than that above described. And the above described apparatus for forcing the air may be applied to other purposes in which air is required to be supplied under pressure.

835.—FORBES, G. H., Broughton Rectory, Northampton, "*An improved combustible compound designed to be used as fuel or for making lime.*" Patent dated March 8, 1873.

This invention relates to a compound of chalk or limestone, and tar, pitch, or bituminous matter with or without certain other ingredients hereinafter specified. The said compound is designed to serve as a substitute for coal or other materials commonly used for fuel, or for making lime.

The said improved compound is made as follows:—Any desired quantity of chalk or limestone is taken, and thoroughly mixed under pressure with tar, pitch, or bituminous matter, in such a manner as to make a compact substance capable of burning more or less readily, according to the purpose for which it is to be used, and according to the proportion of tar, pitch, or bitumen that is consequently used in the manufacture. There may also be incorporated with the above ingredients any desired proportion of wood or peat, or other vegetable substance in fibre, or pulp, or dust, and a small quantity of naphtha or other mineral oil. The said compound may be moulded or otherwise formed into blocks or pieces of any desired or convenient size and shape.

843.—HARRISON, C. W., High Holborn, London, "*Improvements in apparatus for charging or impregnating atmospheric air with the vapour of hydrocarbon liquids.*" Patent dated March 8, 1873.

The specification of this invention describes combining atmospheric air with the vapour of hydrocarbon liquids by passing the air through a long length of tubing placed horizontally either coiled or in lengths placed side by side and communicating with one another, such pipe being charged with the hydro-

carbon liquid to about its horizontal diameter; or in running the liquid slowly down a coil of tubing, and causing a current of air to follow it in its descent.

845.—JUKES, R., Sheffield, "*Certain improvements in the method of consuming smoke, economizing fuel, and producing light, and in the apparatus employed therefor.*" Provisional protection only obtained. Dated March 8, 1873.

The novelty of the invention consists in passing the unconsumed gases evolved from the fuel in furnaces by means of a fan into a gas-receiver, from whence they are drawn by the fan, and again passed over the same furnace or furnaces until the whole of the gases are consumed; also, in passing a portion of the smoke or gases in the receiver through hydrocarbon spirit or oil, in order to impregnate the same with properties that will enable such gases to be employed for illuminating purposes.

846.—SKOINES, H., 7, Argyle Street, King's Cross, London, "*Improvements in the manufacture of gas, and in the treatment of the residues therefrom, and in the combination of gases for the production of light and heat, and in the apparatus employed therein.*" Patent dated March 8, 1873.

This invention relates to certain improvements in the manufacture of gas. The specification in full, with the drawings attached thereto, was given in the JOURNAL for Nov. 4, 1873, page 969.

853.—ROWLEY, J., 84, Camberwell Road, Surrey, "*Improvements in the working of coal gas tar.*" Provisional protection only obtained. Dated March 10, 1873.

Coal gas tar and its homologous products are taken, either together or separate, and treated with acids, alkalies, and chlorine. They are then distilled, and from them is obtained benzole, anthracine, and other products suitable for making aniline dyes.

872.—HEATON, W., Masborough, and GIDDINGS, W. H., Manchester, "*Improvements in ball-cocks or valves used for controlling or regulating the supply of water and other fluids.*" Patent dated March 11, 1873.

This invention relates to those cocks or valves in which a floating ball or vessel attached to a stem, rod, or lever is used to regulate the supply of water or other fluid to cisterns or other receptacles. The improvements consist in making the valve to a certain extent independent of the sliding bucket or piston connected with the stem, rod, or lever to which the float is attached. The bottom of the valve may be flat, semispherical, or other desired shape, or formed as a chamber having in the interior a disc at the bottom of the bucket or piston, and either the valve may be packed with leather, india-rubber, or other packing material, or the packing may be placed in the seating. The outside of the lower part of the bucket can slide up and down in the chamber of the chamber valve, but each of the other valves has at the top a pin fitting loosely a hole in the bottom of the bucket, or is connected to the bucket by one or more links of a chain; and thus either description of valve is independent of the bucket and float, except at certain defined high and low levels of the water. When the water is shut off from the main, any intermediate rising and falling of the water between the high and low levels has no action on the valve and seating, and thus the float can rise and fall a considerable distance without any friction being exerted on the seating.

884.—FISH, W. S., Glasgow, "*Improvements in the manufacture of 'asbestos packing' for piston and valve rods, pistons, pipe-joints, and other similar purposes.*" Patent dated March 12, 1873.

The feature of novelty which constitutes this invention is making asbestos packing of asbestos paper, either alone or coated with caoutchouc or gutta-percha, oils, gummy, farinaceous, or glutinous matters.

891.—JONES, J., Great Lever, Lancaster, "*Improved combinations of substances or materials to be used as a substitute for coal, for obtaining heat and light, and in the arrangement of the furnaces or fire-places connected therewith.*" Provisionalprotection only obtained. Dated March 12, 1873.

This invention consists, first, in combining in various proportions inferior coal, coal refuse, coal base, with sulphur stones, small pieces of paving or other stones, iron stones, copper stones, or other pyrites, mud, peat, or earth, the constituents of water and water, and also the constituents of air and air; and, secondly, in improved arrangements of the furnaces to suit the requirements of combustion.

896.—DARWIN, S. B., Shrewsbury, "*Improvements in the means of manufacturing gas.*" Patent dated March 12, 1873.

This invention has for its object the utilization of common sewage by using it as one of the ingredients from which gas for heating and illuminating purposes may be made.

The way in which it is proposed to be used is as follows:—The sewage having been run into tanks, the liquid and the solid parts are separated by precipitation or otherwise. The solid part is then taken out, deodorized, and spread upon plates, tiles, or other suitable surfaces, and placed on the top of the retort benches, and on the flues, which may be so arranged as to adapt them for thus utilizing what may now be considered, and would otherwise be, waste heat. The liquid still contained in the sewage is here soon evaporated. When the sewage is dry it is triturated or ground in a mill, and mixed with any oleaginous substance, either liquid or solid, petroleum oil and coal tar being preferred. These ingredients may be used either by themselves or together, and in combination with cinders, ashes, bones, putrid flesh or fish, domestic or other refuse, such as is collected by scavengers or other means. When thoroughly incorporated by machinery or other means the material is to be thrown into retorts, carbonized in the usual way, and subsequently condensed, purified, and distributed either alone or mixed with ordinary coal gas or any other gas.

The residual product of carbonization may be mixed and ground by machinery with the spent lime used in the purification, together with a proportion of sulphate of ammonia and other ingredients, thus constituting an artificial manure of considerable value.

In cases where gas is made by the decomposition of steam, the ash would be admirably adapted for insertion in the retort in lieu of coke; or the ash, after being drawn from the retorts, may be used for heating foot-warmers used by railway companies, or, when cool, sampled for filtering and other purposes.

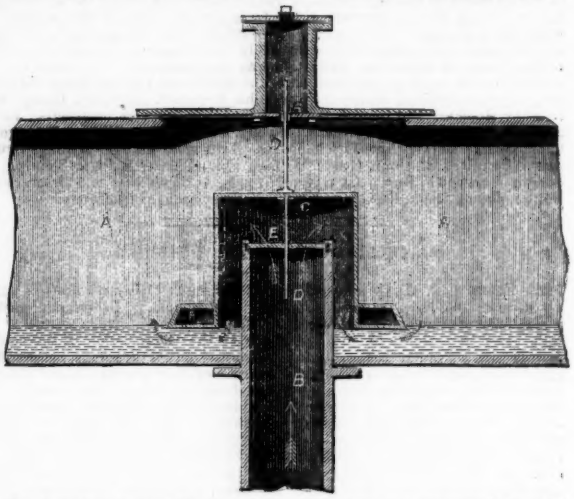
Although no special form of apparatus is requisite for carrying out this invention, it is highly important that the greatest economy should be studied; and as the reduction of the seal in the hydraulic main is conducive thereto, by relieving the retort from undue pressure, and ensuring a greater yield of gas from a given quantity of material, the present inventor has been induced to devise means for this purpose, and has secured the rights thereto by letters patent No. 90, Jan. 13, 1871, and No. 1382, May 23, 1871.

In addition to the plans there exhibited he has invented improvements which, although he lays no claim to as a right secured to him by the above-mentioned letters patent, are explained in the following description:—

In lieu of suspending the cap or cover over the ascension-pipe, and counterbalancing it with weights, as described in patent No. 90, he makes the cap with a concentric hollow ring or float on its lower edge, so that when introduced in the hydraulic main it will swim or float upon the surface of the liquid contained therein. The top of the cap is furnished with a rod or spindle, which works through a hole in a guide-bar attached to the hydraulic, or the spindle may pass through the cap, one end working through a guide-bar fixed to the hydraulic, and the other to a similar guide-bar stretched across the top of the ascension-pipe. By these means the cap or cover is maintained in proper position for effective duty.

A is the hydraulic main; B, the ascension-pipe; and C, the cap with its guide-rod D, D, and guide-bars E, E; F being the float.

The result of using this kind of apparatus is that when the retort is in action the gas has to contend with scarcely any dip or seal on entering the hydraulic main, but escapes under the edge of the floating cap, and is conveyed away in the usual course; but when the retort is discharged or out of action, the back pressure forces the liquid under the cap between it and the enclosed ascension-pipe, thus forming an effective seal against the return of any gas.



The invention is specially adapted for use where the gas manufacture is in the hands of corporations or other local bodies having charge of the sanitary matters, for obvious reasons, amongst which may be mentioned the advantages likely to arise from the control of the sewers, the gathering of ashes and other refuse by the scavangers (admixed as it often is with coal slack and other gas-yielding substances, and the production of gas being under the same authority; besides, the gas-works are usually placed at the lowest part of the town, contiguous in all probability to the outfall of the sewers, which would be most convenient for carrying out any arrangement for the adoption of the invention, the result being the prevention of contaminated rivers and streams.

901.—WOOD, G., Oak Bank, Newton-le-Willows, "*Improved construction of furnace or kiln and in the means and apparatus for the application of gas for heating such furnace or kiln, and also for heating purposes generally.*" Provisional protection only obtained. Dated March 12, 1873.

This invention consists of a circular kiln with a sloping bottom, upon which a melting-pot is placed; the kiln is heated by gas from the side, the gas issuing from a burner enclosed in a casing the back of which is formed with a screen for the admission of air to the burner. The casing is surrounded by an exterior shell also fitted with a screen. Air passes through this second screen, and also through perforations in the casing to the burner.

907.—TYLOR, A., Newgate Street, London, brassfounder, "*Improvements in apparatus and arrangements for measuring water, and regulating, controlling, and arresting the water supply of water-closets, baths, lavatories, and urinals for domestic and other use, and preventing waste.*" Patent dated March 13, 1873.

The following are the improvements embraced in this invention:—

Arranging water-meters with a cylindrical hoop surrounding the exterior of the revolving wheel, in which passages for the water are formed, and to which a cover or flat part is attached, so as to enable the water to raise or lower the same in proportion to the quantity passing, and thereby vary the area of the water passages in proportion to the quantity.

Arranging waste-preventing cocks, taps, and valves, so that the part which acts to shut off the water shall rise gradually during the time the water is passing, until it closes the outlet in place of falling by gravity, and forming them so that they can be adjusted for quantity.

Arranging ball-valves, with levers, to open or shut under high pressure.

Attaching a socket containing a moveable regulating piston, valve, plunger, or plug, to a piston containing a valve or valves opening upwards with a spindle for actuating, and a pipe, tube, or passage opening into the space above the piston, and also into the space below the piston, a cock or screw being provided to adjust the speed of the descent of the moving parts, which is caused by a weighted lever.

Arranging the valves controlling the inlet to and outlet from baths separately, yet so that one cannot be opened until the others are closed, projections attached to the actuating parts only allowing each valve to open when the projection can pass an opening formed on or attached to the actuating part of the other valves or valve, which is only when the same is or are closed.

Forming basins with large outlets or openings closed by a valve to allow of instantaneous discharge; forming basins with a perforated false bottom to act as a strainer, and making basins with an upper and a lower part to allow of the ready removal or application of the perforated false bottom.

Connecting the inlet valves or cocks, and also the outlet valves of lavatory basins, so as to allow of the same being actuated by the use of a single handle or actuating part, or so that one actuating part will control all the inlets, and another all the outlets.

Forming the mouths or inlet to the receptacle of valves, cocks, taps, or supply-pipes of a shape semicircular in plan, and closing them up, making the outer outlet by drilling holes, cutting slits, forming slots in the part closing the same or nearly closing the edges of the mouth of the inlet, so as to form a spreader, and produce a similar action.

Arranging a valve, operated by the actuating arrangement on the air-pipe of the submerged cistern-valves, so as to cause a portion of the water to be retained by atmospheric pressure, and be discharged to seal or wash the pan or hopper when the actuating arrangement goes out of action.

Forming waste-preventing cocks, taps, or valves, for lavatory or other use, so that the part closing the outlet shall be resisted on its return to its seat by a cushion of water in the case, which gradually escaping past the moving part allows it to close gradually without shock or tremor.

948.—MILLS, R., Upper Norwood, Surrey, "*Improvements in gas furnaces.*" Provisional protection only obtained. Dated March 15, 1873.

This invention has for its object the prevention of accident, by explosion or otherwise, when gas is applied to furnaces for heating, and this is attained by constructing the furnace with a succession of hollow perforated bars or tubes placed on a revolving bed, so that each bar is presented successively at the mouth of the furnace, where it becomes charged with gas, which is ignited at or immediately before the admission of the bar to the furnace.

Share List
OF
Metropolitan Gas and Water Companies.

(Corrected by Mr. F. N. Golding, Sun Court, Cornhill, from the latest Stock Exchange Quotations.)

Number of Shares issued.	Amount per Share.	Name.	Amount paid up p. Share.	Dividend p. Cent. p. Annum.	Latest Quotations.
	£	GAS COMPANIES.	£ s. d.	£ s. d.	£
8000	20	Anglo-Romano	20 0 0	10 0 0	22 — 24
5000	20	Bahia (Limited)	20 0 0	3 0 0	9 — 11
1008	20	Do., preference	20 0 0	10 0 0	25 — 27
750	20	Do., do., redeemable	20 0 0	10 0 0	22 — 24
40000	5	Bombay (Limited)	5 0 0	6 15 0	5¾ — 6
10000	5	Do., fourth issue	4 0 0	6 15 0	4¾ — 5
10000	20	British (Limited) (Norwich, Hull-Sculcoates, Hanley, Tunstall & Shelton [Potteries], Trowbridge., and Holywell.)	20 0 0	10 0 0	33 — 35
7500	20	Cagliari (Limited)	20 0 0	7 0 0	15 — 16
160000	10	*Chartered* A shares	10 0 0	10 0 0	14½ — 14⅝
20000	10	Do., A	10 0 0	10 0 0	3 — 3½ pm.
10000	10	Do., B shares, 4 per cent. max.	10 0 0	4 0 0	6½ — 7½
25000	10	Do., 5 per cent. preference	10 0 0	5 0 0	12¼ — 13¼
20000	10	Do., 5 per cent. preference, second issue	10 0 0	5 0 0	12½ — 13½
20000	10	Do., 10 per cent. preference	10 0 0	10 0 0	19½ — 20
12000	25	Do., D shares	25 0 0	10 0 0	48 — 49
17490	100	*Commercial*	100 0 0	10 0 0	154 — 157
20000	20	Continental Union	20 0 0	8 0 0	20½ — 21½
10000	20	Do., new	10 0 0	8 0 0	¼ dis— par
10000	10	Do., new, 1872	2 10 0	8 0 0	¼ dis—¼ pm.
10000	20	Do., preference (Grmny.: Strsbg. France: Cette, Nismes, Montargis Vienne, Roanne, Beaucaire, Rueil, Albi. Italy: Milan, Genoa, Parma, Modena, Alessandria, Messina.)	20 0 0	7 0 0	23 — 25
8000	10	*Crystal Palace District*	10 0 0	10 0 0	15½ — 16
5000	10	Do., preference	10 0 0	6 0 0	12¾ — 13½
10000	10	Do., new shares	10 0 0	7 0 0	11 — 11½
23406	10	European (Limited)	10 0 0	8 0 0	15½ — 15¾
12000	10	Do., new shares (Boulogne, Amiens, Rouen, Caen, Havre, & Nantes.)	5 0 0	8 0 0	3½ — 4½ pm.
4054	10	Foreign and Colonial (Limited)	10 0 0	..	9 — 10
5000	10	Hong Kong (Limited)	10 0 0	10 0 0	13 — 13¼
1560000	100	*Imperial*	100 0 0	10 0 0	157—159
26000	12½	Do., new shares	12 10 0	7 0 0	14½ — 15¼
1300	100	Do., bonds	£100	10 0 0	195 —200
56000	50	*Imperial Continental* (Amsterdam, Berlin, Ghent, Hanover, Lille, Rotterdam., Aix-la-Chapelle, Antwerp, Bordeaux, Brussels, Frankfort-on-Maine, Haarlem, Stolberg, and Vienna.)	43 15 0	9 2 6	54 — 56
8000	40	*Independent*	40 0 0	10 0 0	65 — 67
3000	10	Do.	10 0 0	5 0 0	7½ — 8½
3000	20	Do.	20 0 0	7 10 0	24½ — 25½
..	10	Do., D	1 0 0	..	
250000	Sk.	*London*	100 0 0	10 0 0	153 —155
£15000	Sk.	Do., 1st preference	100 0 0	6 0 0	117 —120
	Sk.	Do., 2nd preference	100 0 0	6 0 0	
	Sk.	Do., 3rd preference	100 0 0	6 0 0	
£18781	100	Do., 1st preference stock	100 0 0	6 0 0	
£11828	100	Do., 2nd preference stock	100 0 0	5 0 0	
15000	5	Malta and Mediterranean (Limited)	5 0 0	5 0 0	2 — 2½
6000	5	Do., preference	5 0 0	7 0 0	5 — 5½
20000	5	Mauritius (Limited)	2 0 0	7 0 0	2 — 2⅛
25000	20	Monte Video (Limited)	20 0 0	..	22 — 23
8000	10	Nictheroy, Brazil (Limited)	10 0 0	..	2½—2 dis.
30000	5	Oriental (Calcutta)	5 0 0	9 0 0	6½— 7
30000	5	Do., new shares	2 10 0	9 0 0	¾—1¼ pm.
10000	5	Ottoman (Limited)	5 0 0	nil.	1⅜— 2½
17500	16	Para (Limited)	16 0 0	7 0 0	7½— 8½
27000	20	*Phœnix*	20 0 0	10 0 0	31½ — 32½
3600007.	100	Do., new	55 0 0	7 10 0	68 — 70
1440007.	Sk.	Do.	100 0 0	5 0 0	90 — 92
5000	20	*Ratcliff*	20 0 0	10 0 0	31 — 32
34000	20	Rio de Janeiro (Limited)	20 0 0	10 0 0	30 — 32
7359	5	Singapore (Limited)	5 0 0	7 10 0	4½ — 5
20000	5	Do., preference	5 0 0	7 10 0	5½ — 6
1500	32½	Shanghai	32 10 0	12 0 0	30 — 32
4000	50	*South Metropolitan*	50 0 0	10 0 0	83 — 85
4000	12½	Do.	12 10 0	10 0 0	20½ — 21½
20000	12½	Do., new shares	2 10 0	10 0 0	¼—¾ pm.
15000	10	*Surrey Consumers*	10 0 0	10 0 0	15½ — 16
10000	10	Do., new	7 0 0	10 0 0	4 — 4½
9000	4	United General (Limerick)	4 0 0	2 10 0	1¾ — 2¼ pm.
1500	10	*Wandsworth and Putney*	10 0 0	10 0 0	14 — 15
1500	10	Do.	10 0 0	7 10 0	11 — 12
2957	10	Do.	10 0 0	7 0 0	
993	10	Do.	3 0 0	7 0 0	
16000	5	*West Ham*	5 0 0	10 0 0	7¾ — 8¼
10000	5	Do., new shares	1 10 0	10 0 0	3—3¼ pm.
		WATER COMPANIES.			
60000	10	Berlin	10 0 0	11 10 0	18 — 20
12000	100	Chelsea	100 0 0	6 0 0	116 —118
18000	100	East London	100 0 0	6 0 0	121 —123
10000	50	Grand Junction	50 0 0	8 10 0	77 — 79
5840	25	Do., ¼ shares	25 0 0	8 10 0	38 — 39
2160	25	Do., new do.; maximum dividend, 7½ per cent.	25 0 0	7 10 0	31 — 33
4396	100	Kent	100 0 0	6 0 0	121 —123
5339	100	Lambeth	100 0 0	6 5 0	121 —122
1161	100	Do.	20 0 0	6 5 0	
442	100	New River	100 0 0	8 0 0	170 —180
4443	100	Do.	20 0 0	8 0 0	36 — 38
4000	100	Do., debenture stock, 4 per cent.	100 0 0	4 0 0	96 — 98
3036	100	Southwark and Vauxhall	100 0 0	5 10 0	99 —101
1296	100	Do., preference stock	100 0 0	5 0 0	100 —101
	100	Do., D shares	100 0 0	5 10 0	98 —100
		Do.	..	4 10 0	
	100	Do., new ordinary	..	4 10 0	
1600	100	Do., new ordinary, No. 1	40 0 0	4 10 0	
13913	61	West Middlesex	61 0 0	£6 per sh.	119 —121

Price Current.

CASTINGS.—*Per Ton.*

Average Weight of Cast-iron Gas-pipes, per Yard.

1 in.	2 in.	2½ in.	3 in.	4 in.	5 in.	6 in.	7 in.	8 in.	9 in.	10 in.	12 in.
16	21	28	33	51	70	89	107	126	149	177	208 lbs.

Retail Prices are 5 to 10 per cent. higher.	London.	Glasgow.	Newcastle and Middlesboro'.	Wales.	Yorkshire, Derbyshire, and Staffordsh.
	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
Pig Iron, No. 1 (g.m.b.)	—	5 7 6	6 7 6	6 0 0	6 5 0
1½ and 2 inch Socket-pipes	11 0 0	10 10 0	10 10 0	10 10 0	10 10 0
2½ and 3 inch do.	10 10 0	9 15 0	9 10 0	9 15 0	9 15 0
4 and 5 inch do.	10 0 0	9 10 0	9 0 0	9 10 0	9 10 0
6 inches and upwards, do.	9 10 0	9 0 0	8 17 6	9 0 0	9 0 0
Retorts, 1st fusion, hot blast	10 10 0	9 15 0	10 15 0	9 15 0	9 15 0
Do., 2nd do., cold do.	—	—	—	—	—
Tank Plates, ¼ thick and above	11 10 0	15 0 0	11 0 0	11 0 0	16 0 0

WROUGHT-IRON TUBES AND FITTINGS.

(Subject to 25 per cent. discount.)

Internal Diameter in Inches.	2	1½	1¼	1	¾	½
TUBES.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Assorted, 2 to 14 feet, per foot	1 9	1 2	0 11	0 8	0 6	0 4½
Pieces, 12 to 23½ inches, each	3 0	2 0	1 8	1 4	1 0	0 9
Do., 3 to 11½ do.	2 3	1 4	1 1	0 11	0 8	0 6
Longscrews, 12 to 23½ do.	4 0	2 6	2 0	1 6	1 2	0 11
Do., 3 to 11½ do.	3 0	2 0	1 3	1 0	0 10	0 8
Bends and Lamp Bends	4 3	2 3	1 9	1 3	0 11	0 8
Springs, various elevations	3 3	1 8	1 4	0 11	0 9	0 7
FITTINGS.						
Square Elbows, equal or reducing	3 6	2 3	1 9	1 2	0 10	0 8
Round Elbows	3 10	2 6	1 11	1 4	1 0	0 9
Tees, equal or reducing	3 9	2 6	1 2	1 3	1 0	0 9
Crosses, do.	5 3	3 6	3 0	2 3	1 9	1 5
Sockets, reducing	1 3	0 11	0 9	0 7	0 6	0 5
Caps and Plugs	1 3	0 10	0 8	0 6	0 5	0 4
Nipples and Backnuts	1 0	0 8	0 6	0 4	0 3½	0 3
Sockets, plain	1 0	0 7	0 6	0 4	0 3½	0 3
Iron Main-Cocks	18 0	11 0	8 6	6 6	4 6	3 6
Syphon Boxes, 2 quarts	23 0	19 0	18 0	17 0	16 0	—

LONDON METAL MARKET.—*Per Ton.*

	£ s. d.		£ s. d.
Copper, tough cake	91 0 0	Tin, English block	121 0 0
Iron, Welsh bar	12 5 0	Tin-plates, best coke I. C.	1 17 0
Lead, English pig	23 15 0	Spelter, foreign	25 5 0

FREIGHTS.

COASTWISE.—*Per Ton.*

Newcastle—	s. d.	s. d.
Chatham and Rochester		7 0
Cork (per keel)	£16	0 0
Dover, Folkestone, and Ramsgate	8	0—9 6
Dublin	£13	0 0—
Exeter Quay (per keel)	£10	0 0—
Ipswich		7 0
London (from Leith)		7 0
London (Pool)		7 0
Lowestoft and Yarmouth		6 0
Portsmouth and Southampton		8 6
Plymouth (per keel)	£8	10 0—
Shoreham		7 6
Whitstable		7 9
Weymouth		7 6

FOREIGN.—*Per Keel.*

	£ s.	£ s.
Barcelona		17 5
Bordeaux		12 0
Boulogne and Calais		9 10
Cadiz		12 0
Cronstadt		10 0
Copenhagen		11 0
Genoa		18 10
Hamburg		10 0
Havre de Grace		10 0
Leghorn		18 0
Lisbon		13 0
Rotterdam		9 10
Stettin		9 0
Trieste		19 10
Venice		24 10

GAS COALS.—*Per Ton.*

Scotch Cannels, f.o.b.—	s. d.
Boghead, at Bo'ness	77 6
Capeldrae, at Burntisland	53 8
Cowdenbeath, do.	—
Donnibristle, do.	52 0
Kirkness, best, do.	53 8
Lesmahago (Auchin.), at Granton	46 0
Do. (Duke of Hamilton's), do.—	
Main	43 6
Wee	46 0
Do. (Nitshill Co.'s), do., and at Glasgow	47 6
Lochgelly, at Burntisland	—
Milton and Crosshill	38 8

Scotch Cannels, f.o.b.—	s. d.
Arniston, at Leith	40 0
Billeyford, at Leith	26 0
Elphinstone Tower, do.	39 0
Grange Cannel, at Bridgeness	—
Haywood, at Granton	—
Kinniel, at Bo'ness	35 0
Lanemark, at Glasgow	—
Lochore, at Burntisland	53 8
Myles' do.	—
Pirnie, at Methill	20 6
Waverley Seam, at Burntisland	—
Old Wemyss Cannel, at Wemyss	45 0
Wemyss Rhumes Cannel	22 6

Newcastle (*Unscreened*)—	Per Ton.
Haswells, Nettlesworth Primrose, and South Pelaw	—
Felling, Framwell Gate, North Pelton, Walker's Primrose, West Wear, and Whitwell Primrose	—
Burnhope, Charlaw, Derwent, East Castle, Edmondsley, Eighton Moor, Hartlepool Pelaw, Holmside, Lambton's Gas, Lanchester Pelaw, Medomsley, Mickley, New Pelaw, Pelaw Main, Pelton Main, Ravensworth, Seaham, South Moor Pelton, South Leverson, Townley Main, West Pelaw, Wearmouth Hutton, and Witton	—
Peareth, Ravensworth Pelaw, Waldridge, West Garesfield, and West Pelton	—
Brancepeth, Dean's Primrose, Londonderry Gas, New Pelton, South Peareth, Urpeth, Washington, and West Leverson	—
Ramsay's Newcastle Cannel	40 0
Wigan Cannel, f.o.b. at Liverpool	40 0

CHEMICALS.

Ammonia—	£ s. d.
Sulphate, white and grey	17 15 0
Do., brown, 23 per cent.	15 15 0
Benzole, 30 per cent.	0 2 4
Carbolic acid	0 1 3

Iron Salts—	£ s. d.
Green and rusty Copperas	3 10 0
Dry do.	2 15 0
Sulphuric Acid	3 10 0

SUNDRIES.

	£ s. d.	£ s. d.
Best Newcastle Fire-bricks, per 1000	—	4 0 0
Do., Fire-clay Retorts, per foot run	0 7 0	0 7 6
Cliff's Fire-bricks, at Wortley, per 1000	—	3 10 0
Ingham's best Wortley Fire-bricks, on rail or boat, per 1000	—	3 10 0
Farnley Iron Co.'s Fire-bricks, do., do.	—	3 10 0
Wortley Fire-clay Retorts, per foot run	0 5 6	0 7 6
Tarred Rope Yarn, per cwt.	—	
Fraser's best Fire-bricks, f.o.b. at Inverkeithing	—	2 10 0
Do. Retorts, per foot run	0 5 0	0 7 6
Do. Ground Fire-clay, per ton	—	0 10 0
Stourbridge Fire-bricks, per 1000	—	3 0 0
Do. Fire-clay, per ton	—	0 12 0

APPLICATIONS FOR LETTERS PATENT.

4170.—Haas, F., Paris, "Improvements in apparatus for heating and lighting by gas." Dec. 19, 1873.
4172.—Akester, J. C., Hull, "An improved silica gas-stove." Dec. 19, 1873.
4174.—Heaton, G. W., Lincoln's Inn, London, and Heaton, C., New York, "An improved and economical method of using steam, air, gas, or other transmissible agent." Dec. 19, 1873.
4178.—Spice, R. P., Parliament Street, Westminster, "Improvements in apparatus used in the manufacture of gas." Dec. 19, 1873.
4181.—Curie, P., Gresham House, London, "Improvements in the evaporations of water, such improvements being applicable to the treatment of sewage and of saline solutions." Dec. 19, 1873.
4192.—Strode, W. W., Mackenzie, J., and Williams, E. P., Osnaburgh Street, Regent's Park, "Improvements in gas-stoves." A communication. Dec. 20, 1873.
4202.—Autier, C., Paris, "A new and improved pressure-cock for the passage of gas and fluids, self-shutting or closing at will." A communication. Dec. 22, 1873.
4229.—Jacquet, F. A., Paris, "Improvements in portable gas-cooking apparatus." Dec. 24, 1873.
4230.—Jacquet, F. A., Paris, "Improvements in gas-heating apparatus." Dec. 24, 1873.
4264.—Deacon, G. F., Liverpool, "Improvements in apparatus for indicating the velocity or measuring the flow of water in pipes." Dec. 29, 1873.
4267.—Sheppard, C., Bridgend, Glamorgan, "Improved apparatus for washing and purifying coal." Dec. 29, 1873.
4273.—Logan, A. W. A., Rochdale, "Improved apparatus for cleaning pipes or tubes." Dec. 30, 1873.
4285.—Beckitt, W. H., Chelmsford, "Improvements in the construction of valves." Dec. 31, 1873.
4294.—Clark, A. M., Chancery Lane, "Improvements in the manufacture of gas and fuel." Dec. 31, 1873.
3.—Lamont, J., Glasgow, "Improvements in the manufacture of illuminating gas, and apparatus or mechanism connected therewith." Jan. 1, 1874.
6.—Gottheil, R., Berlin, "Improvements in the apparatus for measuring the heat of fluids passing through pipes." A communication. Jan. 1, 1874.

GRANTS OF PROVISIONAL PROTECTION.

4088.—Turner, F. W., Hanover, "Improvements in motors to be worked by gas and air." Dec. 11, 1873.
4092.—Ramsay, H. M., Twickenham, Middlesex, "Improvements in the treatment and disposal of sewage." Dec. 12, 1873.
4130.—Phillips, J., Hammersmith, Middlesex, "Improvements in pipe-joints." Dec. 16, 1873.
4160.—Forbes, G. H., Broughton Rectory, Northampton, "Improvements in the manufacture of gas and quicklime." Dec. 18, 1873.
4165.—Harrison, C. W., High Holborn, Middlesex, "Improvements in the manufacture of gas, and in the apparatus employed therein." Dec. 18, 1873.
4170.—Haas, F., Paris, "Improvements in apparatus for heating and lighting by gas." Dec. 19, 1873.
4178.—Spice, R. P., Parliament Street, Westminster, "Improvements in apparatus used in the manufacture of gas." Dec. 19, 1873.
4182.—Firth, J., and Senior, G. A., Halifax, "Improvements in valves." Dec. 19, 1873.
4192.—Strode, W. W., Mackenzie, J., and Williams, E. P., Osnaburgh Street, Regent's Park, "Improvements in gas-stoves." A communication. Dec. 20, 1873.
4202.—Autier, C., Paris, "A new and improved pressure-cock for the passage of gas and fluids, self-shutting or closing at will." A communication. Dec. 22, 1873.

NOTICES TO PROCEED.

2728.—Smyth, J. F., Belfast, "Improvements in apparatus for the manufacture of gas." Aug. 18, 1873.
2729.—Freestone, J. W., Dalston, and Humphris, J., Little Ilford, "An improved process and apparatus for treating spent oxide of iron to extract sulphur and ammoniacal salts therefrom, and for purifying these products." Aug. 18, 1873.
2734.—Forster, J. R., Newcastle-upon-Tyne, "An improved elastic spigot and socket pipe-joint for gas, water, steam, and liquids." Aug. 18, 1873.
2889.—Green, H., Preston, and Barrow, J., West Gorton, near Manchester, "Improvements in effecting the ignition of gas, and apparatus and means for opening the supply of gas to burners, for igniting the gas, and for extinguishing gas lights." Sept. 2, 1873.
3457.—Weems, W., Johnstone, N.B., "Improvements in apparatus or means for lighting and ventilating." Oct. 24, 1873.
3632.—Fraser, A. C., New Barnet, and Watson, W., Great Ayton, near Northallerton, "Improvements in treating and utilizing sewage." Nov. 7, 1873.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

2569.—Farron, S., Ashton-under-Lyne, "Improvements in the construction of cocks or taps." Jnly 29, 1873.
2782.—Brachigny, L. M., and Deschamps, J. E., Rouen, "Improved machinery for obtaining motive power by means of water and air or other fluid." Aug. 22, 1873.
3224.—West, J., Maidstone, "Improvements in apparatus used in the manufacture of gas." Oct. 4, 1873.
3225.—West, J., Maidstone, "Improvements in apparatus used in the manufacture of gas." Oct. 4, 1873.
3291.—Silber, A. M., Whitecross Street, London, and Farquhar, J. F. C., Long Acre, Middlesex, "Improvements in the construction of lamps and lanterns or similar apparatus used for lighting purposes, and in apparatus for heating purposes." Oct. 10, 1873.
3327.—Surmon, H. J., Belvedere, Kent, "Improvements in apparatus for manufacturing gas." Oct. 14, 1873.
3490.—Bray, H., Manchester, "Improvements in the manufacture of gas for illuminating and heating purposes." Oct. 27, 1873.
3610.—Gurney, J., Bradford, "Improvements in the construction of taps or valves." Nov. 6, 1873.

PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

3162.—Parkes, J. J., "Improvements in gas-stoves or apparatus for cooking and heating purposes." Dec. 2, 1870.
3169.—Scott, H. Y. D., "Improvements in the treatment of sewage, and in the preparation of materials to be used for its purification." Dec. 2, 1870.
3179.—Robb, J., "Improvements in four-way valve apparatus." Dec. 3, 1870.
3278.—Marshall, J., "Improvements in apparatus for making tubes." Dec. 14, 1870.
3286.—Allan, W., "Improvements in surface condensers." Dec. 15, 1870.
3304.—Smith, S., "Improvements in cocks and valves." Dec. 17, 1870.
3315.—Russell, R., "Improvements in filters and the fittings connected therewith." Dec. 19, 1870.
3323.—Reid, J., "An improved liquid-meter." Dec. 20, 1870.
3333.—Firth, W., "Improvements in dressing cannel coal, and in apparatus employed for that purpose." Dec. 21, 1870.
3351.—Calvert, C. A., "Improvements in apparatus for drawing off and measuring liquids." Dec. 22, 1870.

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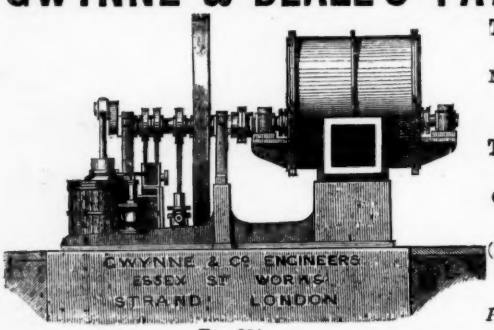

FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

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The oldest Maker, Inventor and Patentee of

GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

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FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the **most perfect system of action yet discovered.** Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the **excellence of the article produced,** and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

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TRACINGS OF DETAILED WORKING DRAWINGS
OF HIS
IMPROVED RETORT-SETTINGS
(FROM 1 TO 9 RETORTS IN A BED),
ADAPTED FOR EITHER COKE OR TAR AS FUEL,

Showing Plans, Transverse and Longitudinal Sections, and Elevations; easily understood by any retort-setter or bricklayer. These Settings are excellent gas producers, with great economy in fuel.

For terms, &c., apply to E. S. CATHELS, ASSOC. INST. C.E., GAS-WORKS, MONTREAL, CANADA.

"On the proper mode of setting the retorts the prosperity of a gaslight establishment mainly depends."—*Vide Peckstone's Treatise on the "Manufacture of Gas."*

CLERK OR COLLECTORSHIP.

WANTED, by the Advertiser, aged 29, a situation as above. Thoroughly understands book-keeping. Was engaged in last situation as clerk and collector for eight years. Good references and testimonials.

Address R. B., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, for a Gas-Work in the neighbourhood of London, two steady men as STOKERS. Each man will have two labourers under him during the winter. They must understand working clay retorts and the management of an exhauster. Wages 28s. per week. Men from the country will be preferred.

Address to A. W., care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED immediately, at the Gas- Works at Holbeach, Lincolnshire, containing twelve retorts, a STOKER, active, strong, and steady. Wages £1 a week the year through.

Apply to GEORGE WRIGHT, the Manager, at the works; or to Richard Caparn, Esq., Solicitor, Clerk to the Company.

Holbeach, Dec. 24, 1873.

TO FOREMEN OF GAS-WORKS.

THE Sao Pedro (Brazil) Gas Company, Limited, require the services of Three FOREMEN, to proceed to their three stations, respectively situated in the province of Rio Grande do Sul, Brazil. They must thoroughly understand the manufacture and distribution of gas, and be capable of keeping carbonizing accounts.

Applications, with testimonials, and stating full particulars of previous experience, also age, whether married or single, and salary required, to be sent on or before the 12th inst., to the Offices of the Company, No. 60, GRACECHURCH STREET, E.C.

CORPORATION GAS-WORKS, DARLINGTON.

STATION-METER FOR SALE.

THE Gas Committee of the Darlington Corporation have for SALE a STATION-METER, made to pass 12,000 cubic feet of gas per hour, hydraulic valves, bye-pass, pressure and water-line gauges, and tell-tale index complete.

This meter has only been in use a few years, and is in good order, and is for sale in consequence of having been superseded by a larger one. The meter may be seen at the Darlington Gas-Works.

Offers to be forwarded to the undersigned.

By order, WM. B. EMMERSON, Engineer.

SOCIETY OF ARTS TECHNOLOGICAL EXAMINATIONS.

An Examination in the Technology of the Manufacture of Gas will be held (in connexion with the Examinations of the Science and Art Department) in May next.

Intending Candidates should apply for programmes (which will be sent gratis) to the Secretary of the Society of Arts, John Street, Adelphi, LONDON, W.C.

EDWARD COCKEY & SONS,
ENGINEERS, IRONFOUNDERS, & CONTRACTORS,
FROME SELWOOD, SOMERSETSHIRE
MANUFACTURERS OF
GASHOLDERS, PURIFIERS, CONDENSERS, SCRUBBERS;
ALSO OF
STEAM-ENGINES, EXHAUSTERS, IMPROVED PUMPS FOR TAR AND LIQUOR,
SLIDE-VALVES,
AND ALL DESCRIPTIONS OF APPARATUS USED IN GAS-WORKS.
PATENTEES AND MANUFACTURERS OF THE
DRY-FACED CENTRE-VALVES,
Which are now so extensively used.

During the last year these Valves have been introduced into some of the large gas-works in London, where they are giving the greatest satisfaction. Favourable reports have been received from the engineers of these and of some of the most important works in the kingdom. The demand for them both for home and foreign works continues unabated.

Every Valve is made with covering bars, to protect ALL the faces. The Patentees found the necessity for this almost immediately after they commenced the manufacture of these Valves, and they have ever since adopted the practice. The large experience they have gained has also enabled them to introduce several minor improvements in the construction of their Valves. It is an advantage peculiar to these Valves that the covers can be easily raised, the faces cleaned and oiled, and kept in perfect condition. If managers of gas-works will periodically attend to this, the Valves will be as good after twenty years use as when first put in.

Messrs. COCKEY AND SONS have been very successful in the erection of many gasholders, some of very large size. They erected, in 1871, at Dublin, for the Alliance Gas Company, one of the largest in the kingdom; telescopic, 182 feet 6 inches diameter. It was referred to by the Chairman of that Company the following year, in his report to the shareholders, as having been in use, and working most effectively, since its erection, and being in the highest degree satisfactory to the Company.

Plans of gas-works are carefully prepared, and every improvement which long practical experience can give is introduced into works entrusted to the care of the Advertisers.

References can be given to the Directors of many Companies who have placed works in their hands, and who will testify to the satisfactory results of so doing.

ON SALE, cheap, a Gasholder, 36 ft. diameter by 12 ft. deep, Station Meter and Governor. Also lot of 6-in., 4-in., and 3-in., Mains, all in capital condition.

Apply to A. C. FRASER, New Barnet, HERTS.

AMMONIACAL LIQUOR.

THE Directors of the Birmingham and Staffordshire Gaslight Company are open to contract for the SALE of the AMMONIACAL LIQUOR produced at their works at West Bromwich and Adderley Street, Birmingham, together or separately, for a term of years to commence on the 1st of July, 1874.

Tenders will be received up to the 1st day February next, and any particulars required in the meantime may be obtained on application to the Secretary, at the Office of the Company, Old Square, Birmingham.

The Directors do not bind themselves to accept the highest or any tender.—By order of the Board,

SAMUEL WALSH, Secretary.

Old Square, Birmingham, Nov. 25, 1873.

THE Scarborough Gas Company, owing to the removal of their works, will have FOR SALE, about October, 1874, the following APPARATUS, the whole of which is in exceedingly good condition :—

Fittings for 140 Retorts, consisting of mouthpieces, ascension, saddle, and dip pipes, and hydraulic and foul mains.

A Condenser, consisting of 40 12-in. pipes, with top and bottom boxes, and inlet, outlet, and bye-pass valves.

Two Scrubbers, each 7 ft. diameter and 16 ft. high, with valves as before.

Two Purifiers, 8 ft. 6 in. square and 5 ft. deep, 20-in. water lutes.

Two Cast-iron Water-Tanks, respectively 24 ft. by 16 ft. by 4 ft., and 20 ft. by 8 ft. by 4 ft. New in 1865.

Two Horizontal Engines, 4 h. p., two single-flue Cornish boilers, and two 20,000 feet per hour Beale's Exhausters. All new in 1866.

One Station-Meter, by Milne, 20,000 feet per hour. New in 1864.

One Gasholder 80 ft. diameter, in two 24-ft. lifts. About 11 years old.

One Gasholder 50 ft. diameter, in two 22-ft. lifts. Only 4 years old.

Two Governors, by Parkinson, on 12-in. and 10-in. mains.

A considerable length of 10-in. Cast-iron Socket and other Pipes.

An inspection of the above Apparatus is requested by the Officers of Companies requiring enlargements or extensions, and offers to purchase will be duly considered.

By order of the Board,

JAMES MOON,

Manager and Secretary to the Company.

Just published, price 10s. 6d.,

REGISTRATION OF DISTRIBUTORY PLANT.

The forms for this purpose are to illustrate the Paper on Distribution of Gas, read at the Edinburgh Meeting of the British Association of Gas Managers. By the use of the synopsis the whole of the out-door plant may at once be seen, with all matters pertaining to the same.

W. J. WARNER, Engineer.

South Shields.

Demy 32 mo., oblong, pp. 34.

HOW MUST I MANAGE THE GAS?

By J. O. N. RUTTER.

Second Edition.

Intended for Gas Companies to give to their Customers.

Prices: 1000 copies, £4 4s.; 100 copies, 10s., free by post. Apply to J. O. N. RUTTER, Black Rock, BRIGHTON.

Demy 16mo., Sixty-four pages,

ADVANTAGES of GAS. By J. O. N. RUTTER. A new edition.—201st Thousand. Brighton: Published by the Author.

This little book is intended for distribution by Gas Companies and the manufacturers of gas apparatus. It has done good in making known the benefits and promoting the sale of gas; and it is hoped that its usefulness might be continued and greatly extended.

Prices :—1000 copies, £8; 500 copies, £4 5s.; 250 copies, £2 5s. Any smaller number at 20s. per 100 copies.

A specimen copy free per post for three penny stamps. Covers printed specially.

Apply to J. O. N. RUTTER, Black Rock, BRIGHTON.

Nov. 13, 1871.

TO GAS COMPANIES.

PATENT FUEL AND LIME CEMENT FROM GAS LIME.

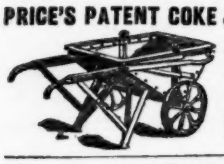
This invention (protected by three patents) consists in a new method of turning the foul lime of Gas-Works to profit. The process is very simple and inexpensive, and can be worked by Gas Companies at a very small outlay.

By simply mixing the foul lime with tar it is converted in the first instance into an excellent fuel. By burning this fuel a very valuable material for building purposes is obtained, which can be used either as lime or cement or plastic. When used as cement it will be found equal to the best Portland in durability and hardness.

Licences to work the invention will be granted by the Patentee to Gas Companies on very reasonable terms.

For further particulars apply to Mr. E. MADDOCKS, Manager of the Gas-Works, KETTERING.

PRICE'S PATENT COKE & COAL BARROW,



effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

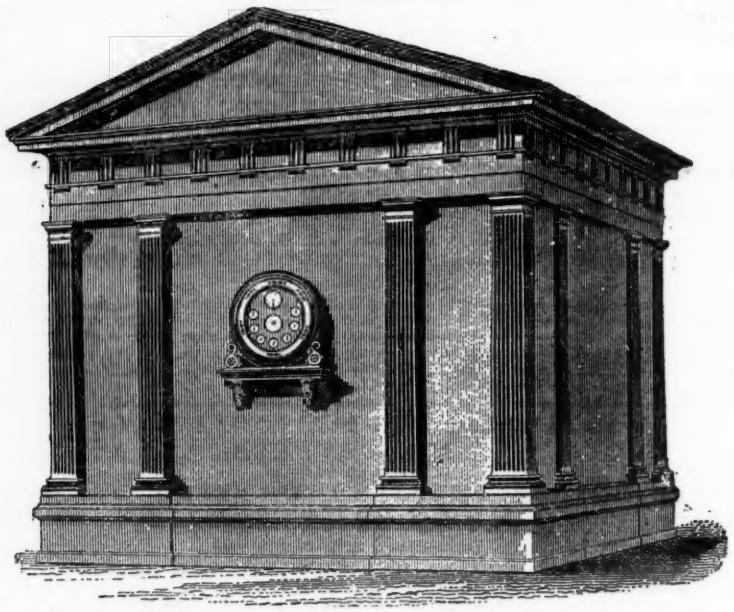
MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS

OF THE HIGHEST EXCELLENCE;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

GAS COOKING APPARATUS.

WATER-METERS SUITABLE FOR ALL PRESSURES.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.

THE THAMES BANK IRON COMPANY,

(Successors to LYNCH WHITE,)

SUPPLY FROM STOCK

CAST-IRON RETORTS, SOCKET-PIPES for GAS or WATER PURPOSES, FLANGE-PIPES for STEAM, RAIN-WATER PIPES and GUTTERS, HOT-WATER PIPES and BOILERS, and all requisite Connexions for same; also LAMP-COLUMNS, LAMPS, WROUGHT FRAMES, WROUGHT-IRON TUBING, &c., &c.

All kinds of Gas-Works Apparatus and General Castings made to Pattern or Drawing.

ADDRESS—

OLD BARGE WHARF, UPPER GROUND STREET, LONDON, S.E.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

19, NORTHUMBERLAND STREET, STRAND, W.C.

MR. ANDERSON advises Companies on all matters connected with the manufacture of Gas and the construction of Works.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS, heated by tar without the production of smoke.

STEAM-ENGINES and EXHAUSTERS, separately or combined.

FOUR-WAY VALVES, one of which is equal to three ordinary Valves.

STATION GOVERNORS—the Gasholder cannot tilt and cause accident.

BREEZE AND TAR FUEL MACHINE.

A Pamphlet containing Eighteen Illustrations of the foregoing, with letterpress on the construction of Works, post free, 2s. 6d.

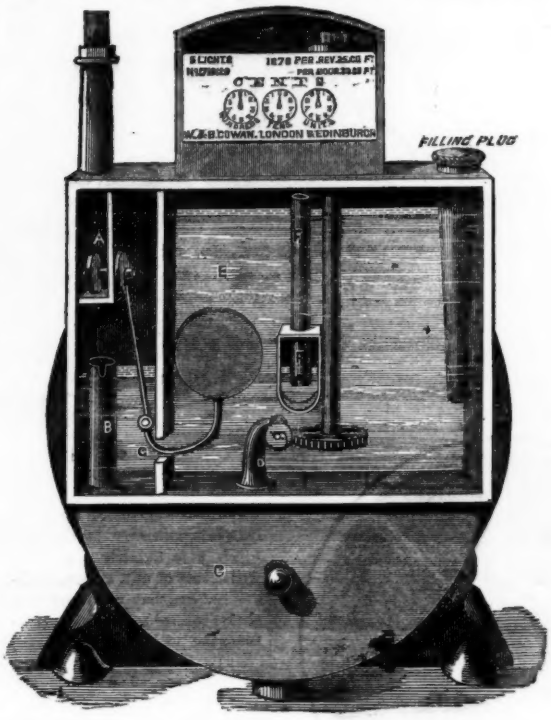
N.B.—The second edition of this Work, *now ready*, co illustrations of the Machine for converting Breeze and Tar into Fuel for heating the Retorts.

"The Author is well qualified to speak authoritatively upon the important subjects to which his pamphlet refers."—*Artizan.*

ESSON'S

PATENT COMPENSATING GAS-METER,

IN TIN CASE, PATENT SIDE VALVE ARRANGEMENT.



DESCRIPTION:

The gas passes from the valve-box A by the overflow-pipe B into the waste water box C, and upwards through the spout D to the measuring drum; E is the compensating fountain, in which also is the float, the lever of which, passing through the hole G, opens and shuts the valve.

When the water level in the meter lowers, the *bottom end* of the air or gas tube F becomes unsealed, thereby admitting air or gas into the upper part of the fountain, which, causing water to pass through the hole G, restores the level in the meter, when this action ceases.

The float and valve are beyond the influence of either inlet or outlet pressure, and the fountain is large enough for a year's supply.

SOLE MANUFACTURERS,

W. & B. COWAN,

WET AND DRY GAS-METER MANUFACTURERS,

(ESTABLISHED 1827,)

King Henry's Walk,
BALLS POND ROAD,
LONDON, N.

BUCCLEUCH ST. WORKS,
EDINBURGH.

BRONNER'S PATENT GAS-BURNERS give 99 per cent. of light, as compared with 27 per cent. given by ordinary burners, with equal consumption of gas.—*Vide* "Gas Referees Report," published June, 1869.

HENRY GREENE AND SON, Sole Consignees of Brönner's Patent Improvements in Gas Lighting, 16 and 17, King William Street, LONDON, E.C.

B. CARPENTER,

THE ORIGINAL MANUFACTURER OF

WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

WORKS:

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BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B Instruments, Bells, and Apparatus.

J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

A. C. FRASER, late of the Corporation Gas-Works, Middlesborough, is prepared, after 20 years experience, to advise Corporations and Gas Companies in the Erection of new and Improvement of existing Works.

New Barnet, Herts.

MR. WILLIAM DORE (19 years Gas Engineer and Accountant) may be CONSULTED upon all matters relating to the manufacture and distribution of gas, and the management, accounts, or transfer of gas undertakings.

Office, 4, Picton Place, Neath, SOUTH WALES.

MR. NORWOOD EARLE, late of the Dover Gas-Works, is prepared, after 17 years experience, to undertake the duties of SURVEYOR to Gas Companies and Corporations in all matters relating to the Distribution of Gas and Gas Testing. Contracts entered into for the Survey of Mains, Services, Public Lamps, &c., in order to reduce the per centage of unaccounted-for gas to the lowest possible amount.

Valuations for Assessment, Transfer, and other purposes.

Offices, MANSION HOUSE CHAMBERS, 12, Queen Victoria Street, LONDON, E.C.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of Clay Retorts, Fire-Bricks and every description of Fire-Clay Goods.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS,

&c., &c.,

SCOTSWOOD FIRE-BRICK WORKS,

NEAR

BLAYDON-ON-TYNE.

FIRE-CLAY RETORTS.

WILLIAM FRASER,

INVERKEITHING,

(Owner of the Works at which Fire-Clay Retorts were first made), can supply

RETORTS, FIRE-BRICKS, &c.,

to any extent.

References can be given to managers of above a hundred Gas-Works whom he supplies.

He ships at Charlestown his

CELEBRATED HALBEATH STEAM COALS,

on Navy List.

INTERNATIONAL EXHIBITION, 1862.

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PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and

"HONOURABLE MENTION" for

good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,

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NEWCASTLE-ON-TYNE.

JAMES NEWTON & SONS,

(Established 1820,)

FIRE-BRICK AND TILE MERCHANTS,

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DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY,

and every Article suitable for

GAS AND WATER WORKS.

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BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

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Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICK.

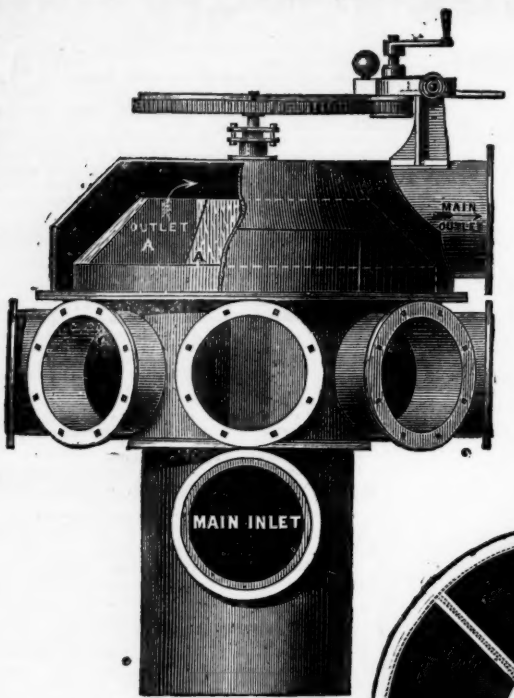
Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

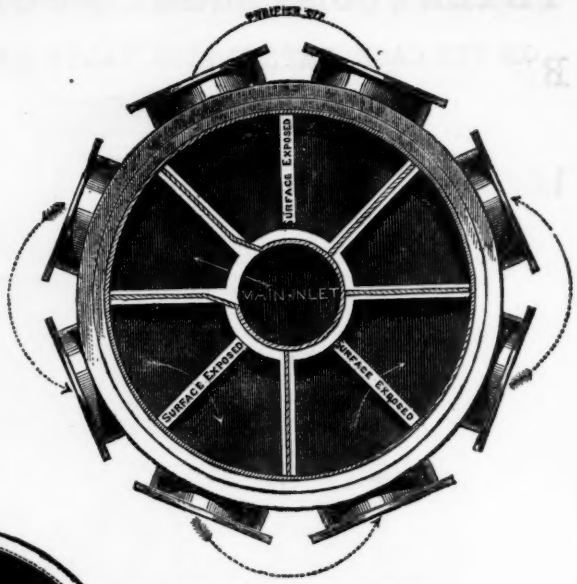
Successors to

E. BAKER AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

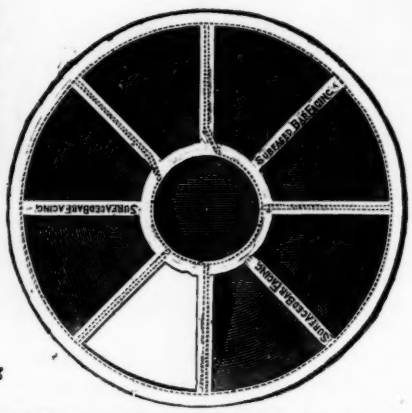
C. & W. WALKERS' PATENT CENTRE-VALVES.



Elevation of the Centre-Valve for four Purifiers. The safety cover is shown broken, to enable the Valve itself, which is inside, to be seen.



Plan of the Body, showing the Valve lying in it, with three of the facings, which were formerly exposed to settlements of dirt, carbon, naphthaline, &c., but which are now always covered by the surfaced bar-facings of the Valve. (See below.)



Plan of the Valve, or upper portion, showing the surfaced bar-facings referred to above.

These PATENT CENTRE-VALVES are the most perfect and certain means for working Purifiers. The Valve itself is protected from all injury inside the safety cover. The working of the Valve is so easy, and so governed by the stop-catch movement, that the Purifiers can be instantaneously changed in the dark as well as in daylight. They are scraped perfectly true, metal to metal, the facings heretofore exposed are always covered, and there is nothing more reliable, certain, and durable in a gas-works. By their use the floor of the Purifying-house is clear and level; the Valve and all connexions being beneath the floor, out of the way of working. A very considerable improvement and saving is effected in the cost of the connecting-pipes.

FOUR-WAY CENTRE-VALVES FORMING INLET, OUTLET, AND BYE-PASS.

MIDLAND IRON-WORKS, DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
BELFAST.

BIRTLEY IRON WORKS,
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Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.
Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.
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SOLE AGENT FOR
EDGE'S PATENT
FOR REMOVING THE
CARBONACEOUS INCRUSTATION FROM GAS-RETORTS.

HARRIS AND PEARSON,
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Proprietors of
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Manufacturers of
FIRE-BRICKS, GAS-RETORTS, & FIRE-CLAY GOODS of every description.
Orders of any magnitude, for home and exportation, executed with all possible despatch.
N.B.—A quantity of Retorts in stock. Circulars, 15 in. and 16 in. Ovals, 20 in. by 14 in. D's, 15 in. by 13 in.; 16 in. by 12 in.; 18 in. by 14 in. 20 in. by 16 in.; 21 in. by 14 in.; and 24 in. by

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64, BANKSIDE, SOUTHWARK, LONDON, S.E.
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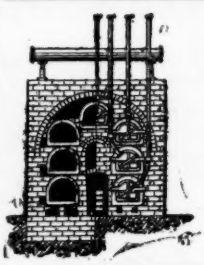
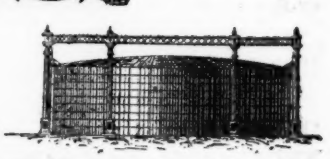
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.



HENRY SKOINES,
PATENTEE
AND
CONTRACTING
GAS
ENGINEER,
FOR



SETTING RETORTS,
ERECTING AND REMODELLING GAS-WORKS
Of any extent, at Home or Abroad,
Address, 7, ARGYLE STREET, KING'S CROSS, LONDON, W.C.

GEORGE WALLER & CO.,

GAS ENGINEERS AND CONTRACTORS,

MANUFACTURERS OF

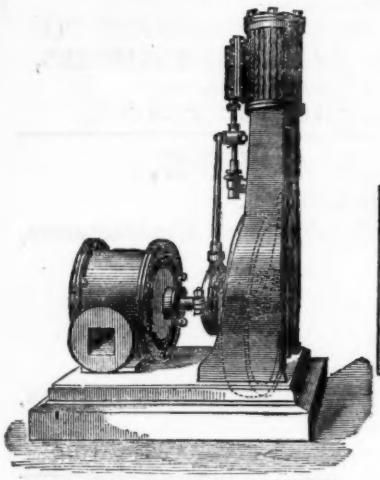
BEALE'S IMPROVED PATENT GAS-EXHAUSTERS,

COMBINED ENGINES AND EXHAUSTERS,

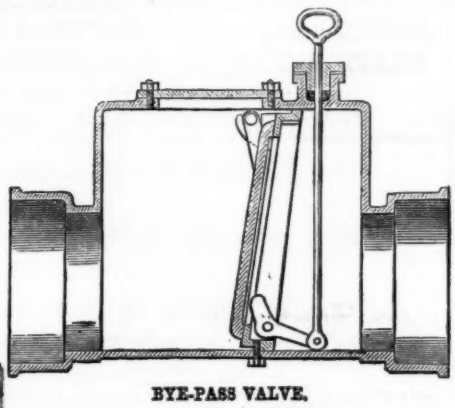
IMPROVED HYDRAULIC REGULATORS, IMPROVED BYE-PASS VALVES,

TAR AND LIQUOR PUMPS,

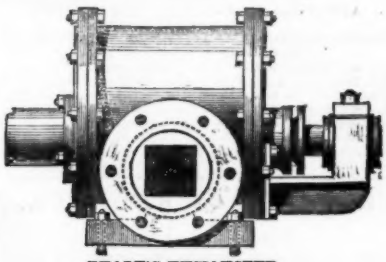
VALVES, COAL LIFTS, STEAM HOISTS, RETORT-HOUSE TOOLS, &c.



COMBINED ENGINE & EXHAUSTER.

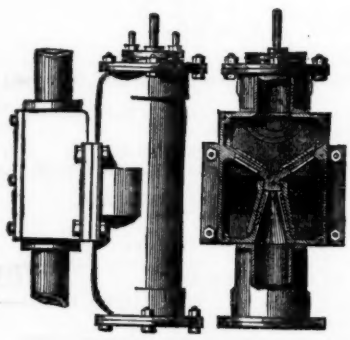


BYE-PASS VALVE.

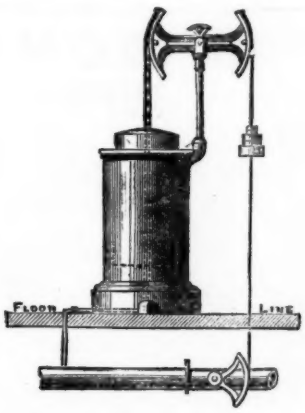


BEALE'S EXHAUSTER.

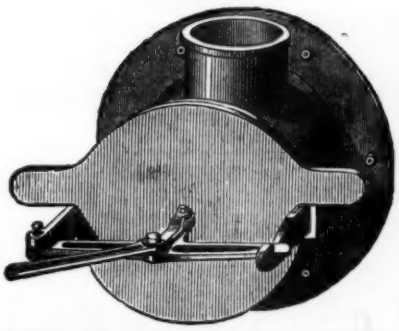
GAS-VALVE.



TAR and LIQUOR PUMPS.



HYDRAULIC REGULATOR.



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Lists on application.

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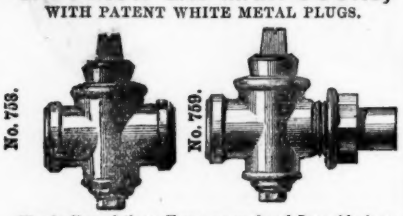

The bodies of these Taps are made of Iron, black or galvanized, and the Plugs of Patent Metal. They are warranted not to set fast or corrode as do iron or brass Cocks, will always work easily, are strong, well made, durable, of little or no intrinsic value, and, therefore, not likely to be stolen; and the PRICES are (especially upon the larger sizes) FULLY 50 PER CENT. LESS THAN BRASS COCKS.

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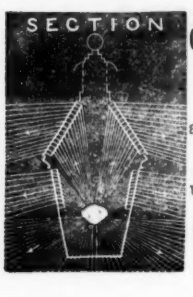

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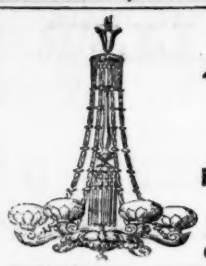
INVENTOR AND PATENTEE.



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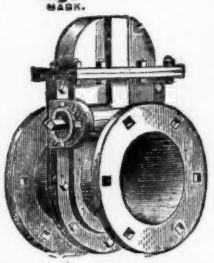

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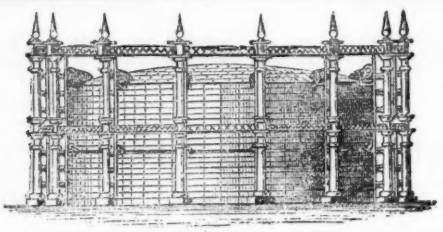

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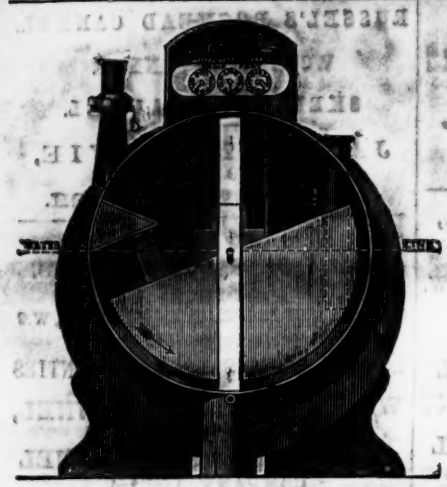

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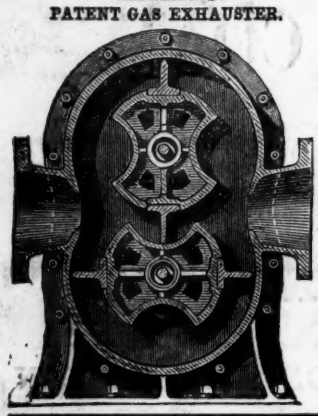

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